GE Healthcare

Centricity© PACS Version 7.0

DICOM CONFORMANCE STATEMENT

DOC2327903

Confidentiality and Proprietary Rights

This document is the confidential property of GE Healthcare, a division of General Electric Company (“GE Healthcare”). No part of this document may be reproduced in any form, by photostat, microfilm, xerography, or any other means, or incorporated into any information retrieval system, electronic or mechanical, without the written permission of GE Healthcare. Inquiries regarding copying and/or using the materials contained in this document outside of the limited scope described herein should be addressed to the e-mail address listed above.

GE Healthcare reminds you that there may be legal, ethical, and moral obligations for medical care providers to protect sensitive patient information when dealing with vendors such as GE Healthcare. You should obtain explicit written consent from both the patient and GE Healthcare before you disclose sensitive patient information to GE Healthcare.

Limitations and Conditions of Use

This document is the confidential property of GE Healthcare and is furnished to you, a current GE Healthcare customer, pursuant to a non-disclosure agreement (“NDA”) between you and GE Healthcare. If you are not (i) a current GE Healthcare customer, and (ii) subject to an NDA with GE Healthcare, you are not authorized to access this document.

The information contained herein is confidential and should not be used, disclosed, or duplicated for any purpose other than developing information system plans within GE Healthcare customer organizations. Duplication and/or distribution of this document beyond GE Healthcare customer organization information systems and management executives are not allowed without express written consent from GE Healthcare.

Trademarks

GE, the GE Monogram, Centricity and imagination at work are trademarks of General Electric Company.

All other product names and logos are trademarks or registered trademarks of their respective companies.

Disclaimers

Any information related to clinical functionality is intended for clinical professionals. Clinical professionals are expected to know the medical procedures, practices and terminology required to monitor patients. Operation of the product should neither circumvent nor take precedence over required patient care, nor should it impede the human intervention of attending nurses, physicians or other medical personnel in a manner that would have a negative impact on patient health.

General Electric Company reserves the right to make changes in specifications and features shown herein, or discontinue the products described at any time without notice or obligation. This does not constitute a representation or warranty or documentation regarding the product or service featured. All illustrations or examples are provided for informational or reference purposes and/or as fictional examples only. Your product features and configuration may be different than those shown. Contact your GE Representative for the most current information.

The links provided to other Internet sites are only for the convenience of user/reader of this document. GE is not responsible for the availability or content of these external sites, nor does GE endorse, warrant or guarantee the products, services or information described or offered at these other Internet sites. Additionally, for documents available on these sites, GE does not warrant or assume any legal liability or responsibility for the accuracy, completeness, usefulness or lawfulness of any information, apparatus, product, or process disclosed.

GE Healthcare
500 W. Monroe Street
Chicago, IL 60661 USA
www.gehealthcare.com

REVISION HISTORY

Revision	Date	Author	Description
1	November 2, 2019	Tim Masters	Initial version

CONFORMANCE STATEMENT OVERVIEW

Table 0.1 provides an overview of the network services supported by Centricity PACS.

Note: Though Centricity PACS may be able support storage of SOP classes as an SCP, the Centricity PACS workstation and Centricity PACS print service may not be able to operate on them. See the sections 2.3.1.4.3.4 and 2.3.3.3.1 for more information regarding SOP class support for display or print.

TABLE 0.1 – NETWORK SERVICES

SOP Classes	User of Service (SCU)	Provider of Service (SCP)
Transfer		
Computed Radiography Image Storage	Yes	Yes
Digital X-Ray Image Storage – For Presentation	Yes	Yes
Digital X-Ray Image Storage – For Processing	Yes	Yes
Digital Mammography X-Ray Image Storage – For Presentation	Yes	Yes
Digital Mammography X-Ray Image Storage – For Processing	Yes	Yes
Digital Intra-oral X-Ray Image Storage – For Presentation	Yes	Yes
Digital Intra-oral X-Ray Image Storage – For Processing	Yes	Yes
CT Image Storage	Yes	Yes
Enhanced CT Image Storage	Yes	Yes
Ultrasound Multi-Frame Image Storage (Retired)	Yes	Yes
Ultrasound Multi-frame Image Storage	Yes	Yes
MR Image Storage	Yes	Yes
Enhanced MR Image Storage	Yes	Yes
MR Spectroscopy Storage	Yes	Yes
Nuclear Medicine Image Storage (Retired)	Yes	Yes
Ultrasound Image Storage (Retired)	Yes	Yes
Ultrasound Image Storage	Yes	Yes
Enhanced US Volume Storage	Yes	Yes
Secondary Capture Image Storage	Yes	Yes
Multi-frame Grayscale Byte Secondary Capture Image Storage	Yes	Yes
Multi-frame Grayscale Word Secondary Capture Image Storage	Yes	Yes
Multi-frame True Color Secondary Capture Image Storage	Yes	Yes
Standalone Curve Storage (Retired)	Yes	Yes
12-lead ECG Waveform Storage	Yes	Yes
General ECG Waveform Storage	Yes	Yes
Hemodynamic Waveform Storage	Yes	Yes
Grayscale Softcopy Presentation State Storage	Yes	Yes
X-Ray Angiographic Image Storage	Yes	Yes
Enhanced XA Image Storage	Yes	Yes
X-Ray Radiofluoroscopic Image Storage	Yes	Yes
X-Ray Angiographic Bi-plane Image Storage (Retired)	Yes	Yes
X-Ray 3D Angiographic Image Storage	Yes	Yes
Breast Tomosynthesis Image Storage	Yes	Yes
Nuclear Medicine Image Storage	Yes	Yes
Intravascular Optical Coherence Tomography Image Storage – For Presentation	Yes	Yes
Intravascular Optical Coherence Tomography Image Storage – For Processing	Yes	Yes
Raw Data Storage	Yes	Yes
Segmentation Storage	Yes	Yes
Real World Value Mapping Storage	Yes	Yes
VL Endoscopic Image Storage	Yes	Yes
Video Endoscopic Image Storage	Yes	Yes
VL Microscopic Image Storage	Yes	Yes
VL Slide-Coordinates Microscopic Image Storage	Yes	Yes

SOP Classes	User of Service (SCU)	Provider of Service (SCP)
VL Photographic Image Storage	Yes	Yes
Basic Text SR	Yes	Yes
Enhanced SR	Yes	Yes
Comprehensive SR	Yes	Yes
Procedure Log Storage	Yes	Yes
Mammography CAD SR	Yes	Yes
Key Object Selection Document	Yes	Yes
Chest CAD SR	Yes	Yes
X-Ray Radiation Dose SR	Yes	Yes
Encapsulated PDF Storage	Yes	Yes
Positron Emission Tomography Image Storage	Yes	Yes
RT Image Storage	Yes	Yes
RT Dose Storage	Yes	Yes
RT Structure Set Storage	Yes	Yes
RT Beams Treatment Record Storage	Yes	Yes
RT Plan Storage	Yes	Yes
RT Brachy Treatment Record Storage	Yes	Yes
RT Treatment Summary Record Storage	Yes	Yes
Phillips Live 3D 01 (Phillips HP Sonos 7500) Private Storage	Yes	Yes
Phillips Live 3D 02 (Phillips HP Sonos 7500) Private Storage	Yes	Yes
GE 3D Model Image (GE Advantage 3D XR)	Yes	Yes
GE PET Advance Raw Data (GE AW Raw)	Yes	Yes
Query/Retrieve		
Patient Root Query/Retrieve Information Model – FIND	No	Yes
Patient Root Query/Retrieve Information Model – MOVE	No	Yes
Study Root Query/Retrieve Information Model – FIND	Yes	Yes
Study Root Query/Retrieve Information Model – MOVE	Yes	Yes
Patient/Study Only Query/Retrieve Information Model – FIND	No	Yes
Patient/Study Only Query/Retrieve Information Model – MOVE	No	Yes
Print Management		
Basic Film Session SOP Class	Yes	No
Basic Film Box SOP Class	Yes	No
Basic Grayscale Image Box SOP Class	Yes	No
Basic Grayscale Print Management Meta SOP Class	Yes	No
Printer SOP Class	Yes	No
Workflow Management		
Storage Commitment Push Model SOP Class	No	Yes
Modality Performed Procedure Step SOP Class	Yes	Yes
General Purpose Worklist Information Model – FIND SOP Class	No	Yes
General Purpose Scheduled Procedure Step SOP Class	No	Yes
General Purpose Performed Procedure Step SOP Class	Yes	Yes
General Purpose Worklist Management Meta SOP Class	No	Yes
Instance Availability Notification SOP Class	Yes	No

Note: Centricity PACS does not provide media services in the product. The storage format of SOPs within the product is proprietary. A third party solution, DMC-EZ is offered to provide export of SOPs on a per study basis from Centricity PACS. The vendor supplies their own conformance statement upon request.

TABLE OF CONTENTS

1. **INTRODUCTION 1–1**

1.1 OVERVIEW 1–1
1.2 OVERALL DICOM CONFORMANCE STATEMENT DOCUMENT STRUCTURE 1–2
1.3 INTENDED AUDIENCE 1–3
1.4 SCOPE AND FIELD OF APPLICATION 1–3
1.5 IMPORTANT REMARKS 1–4
1.6 REFERENCES 1–5
1.7 DEFINITIONS 1–5
1.8 SYMBOLS, TERMS AND ABBREVIATIONS 1–7

2. **NETWORK CONFORMANCE STATEMENT 2–1**

2.1 INTRODUCTION 2–1
2.2 IMPLEMENTATION MODEL 2–2
2.2.1 Application Data Flow Diagrams 2–3
2.2.2 Functional Definitions of AEs 2–14
2.2.3 Sequencing of Real-World Activities 2–18
2.3 AE SPECIFICATIONS 2–18
2.3.1 DAS AE 2–18
2.3.2 RA1000 AE 2–76
2.3.3 CDPS AE 2–82
2.4 COMMUNICATION PROFILES 2–89
2.5 SUPPORTED COMMUNICATION STACKS 2–89
2.5.1 Physical Media Support 2–89
2.6 EXTENSIONS / SPECIALIZATIONS / PRIVATIZATIONS 2–89
2.6.1 Extension / Specialization SOP Classes 2–89
2.6.2 Privatized SOP Classes 2–89
2.6.3 Privatized Transfer Syntax 2–89
2.7 CONFIGURATION 2–90
2.7.1 AE Title/Presentation Address Mapping 2–90
2.7.2 Maximum Simultaneous Associations 2–90
2.7.3 AE Title / Accepted Association Mapping 2–91
2.7.4 AE Title / Association Initiation Mapping 2–91
2.7.5 Server Time-Out 2–91
2.7.6 Message Validation 2–91
2.7.7 Maximum PDU Size Accepted 2–91
2.8 SUPPORT FOR EXTENDED CHARACTER SETS 2–91
2.9 CODES AND CONTROLLED TERMINOLOGY 2–92
2.10 SECURITY PROFILES 2–92

3. **MEDIA STORAGE CONFORMANCE STATEMENT 3–1**

4. **GRAYSCALE SOFCOPY PRESENTATION STATE IOD IMPLEMENTATION 4–1**

4.1 CENTRICITY PACS MAPPING OF DICOM ENTITIES 4–1
4.2 IOD MODULE TABLE 4–1
4.3 INFORMATION MODULE DEFINITIONS 4–2
4.3.1 Patient Entity Modules 4–2
4.3.2 Study Entity Modules 4–3
4.3.3 Series Entity Modules 4–3
4.3.4 Equipment Entity Modules 4–3
4.3.5 Presentation State Entity Modules 4–4
4.4 STANDARD EXTENDED AND PRIVATE DATA ATTRIBUTES 4–10

4.4.1 Private Group “GEIIS_RA1000” 4–11
4.4.2 Private Group “GEIIS PACS” 4–13
4.5 STANDARD EXTENDED AND PRIVATE CONTEXT GROUPS 4–14
4.6 IMPORTANT REMARKS 4–14
4.6.1 Grayscale Image Consistency 4–14
4.6.2 Pixel Spacing Handling 4–14

5. KEY OBJECT SELECTION DOCUMENT IOD IMPLEMENTATION 5–1

5.1 CENTRICITY PACS MAPPING OF DICOM ENTITIES 5–1
5.2 IOD MODULE TABLE 5–1
5.3 INFORMATION MODULE DEFINITIONS 5–2
5.3.1 Series Entity Modules 5–2
5.3.2 Document Entity Modules 5–2
5.4 STANDARD EXTENDED AND PRIVATE DATA ATTRIBUTES 5–3
5.5 STANDARD EXTENDED AND PRIVATE CONTEXT GROUPS 5–3
5.6 STANDARD, STANDARD EXTENDED AND PRIVATE TEMPLATES 5–4
5.6.1 Standard Templates 5–4
5.6.2 Standard Extended Templates 5–5
5.6.3 Private Templates 5–5

6. MODALITY PERFORMED PROCEDURE STEP IMPLEMENTATION 6–1

6.1 RELATIONSHIP BETWEEN SCHEDULED AND PERFORMED PROCEDURE STEPS 6–1
6.2 MODALITY PERFORMED PROCEDURE STEP MODULE TABLE 6–1
6.3 MODALITY PERFORMED PROCEDURE STEP MODULE DEFINITIONS 6–2
6.3.1 SOP Common Module 6–2
6.3.2 Performed Procedure Step Relationship Module 6–2
6.3.3 Performed Procedure Step Information Module 6–3
6.3.4 Image Acquisition Results Module 6–4
6.4 STANDARD EXTENDED AND PRIVATE DATA ATTRIBUTES 6–5
6.5 STANDARD EXTENDED AND PRIVATE CONTEXT GROUPS 6–5

7. INSTANCE AVAILABILITY NOTIFICATION IMPLEMENTATION 7–1

7.1 IOD MODULE TABLE 7–1
7.2 INFORMATION MODULE DEFINITIONS 7–1
7.2.1 SOP Common Module 7–1
7.2.2 Instance Availability Notification Module 7–2

8. STORAGE COMMITMENT PUSH MODEL IMPLEMENTATION 8–1

8.1 STORAGE COMMITMENT PUSH MODEL INFORMATION OBJECT DEFINITION 8–1
8.1.1 Storage Commitment Module for N-ACTION 8–1
8.1.2 Storage Commitment Module for N-EVENT-REPORT 8–1

9. PRINT MANAGEMENT IMPLEMENTATION 9–1

9.1 PRINTER SOP CLASS 9–1
9.1.1 Printer N-EVENT-REPORT Attributes 9–1
9.1.2 Printer N-GET Attributes 9–1
9.2 BASIC FILM SESSION SOP CLASS 9–2
9.2.1 Basic Film Session N-CREATE Attributes 9–2
9.2.2 Basic Film Session N-DELETE 9–3
9.3 BASIC FILM BOX SOP CLASS 9–3
9.3.1 Basic Film Box N-CREATE Attributes 9–3
9.3.2 Basic Film Box N-ACTION Attributes 9–4
9.3.3 Basic Film Box N-DELETE 9–4
9.4 BASIC GRAYSCALE IMAGE BOX SOP CLASSES 9–4

9.4.1 Basic Grayscale Image Box Pixel N-SET Attributes....9–4

10. QUERY IMPLEMENTATION....10–1

10.1 CENTRICITY PACS MAPPING OF DICOM ENTITIES....10–1
10.2 INFORMATION MODEL KEYS....10–1
10.2.1 Common Query Keys....10–1
10.2.2 Patient and Patient/Study Only Root....10–3
10.2.3 Study Root....10–3
10.3 IMPORTANT REMARKS....10–6
10.3.1 Matching Operations....10–6

11. GENERAL PURPOSE WORKLIST IMPLEMENTATION....11–1

11.1 CENTRICITY PACS MAPPING OF DICOM ENTITIES....11–1
11.2 GENERAL PURPOSE SCHEDULED PROCEDURE STEP MODULES....11–1
11.3 GENERAL PURPOSE PERFORMED PROCEDURE STEP MODULES....11–1
11.4 GENERAL PURPOSE WORKLIST QUERY MODULES....11–3
11.5 STANDARD EXTENDED AND PRIVATE DATA ATTRIBUTES....11–6
11.6 STANDARD EXTENDED AND PRIVATE CONTEXT GROUPS....11–6

12. PRIVATE ATTRIBUTES IMPLEMENTATION....12–1

12.1 PRIVATE DATA ELEMENTS OF ORIGINAL UID VALUES....12–1
12.2 PRIVATE DATA ELEMENTS OF SIGNIFICANT/ REJECT/ CONFIDENTIAL....12–1
12.3 PRIVATE DATA ELEMENTS OF GRAYSCALE SOFTCOPY PRESENTATION STATE IOD....12–2
12.4 PRIVATE DATA ELEMENTS OF COMPRESSION INFORMATION....12–2
12.5 PRIVATE DATA ELEMENTS OF ASSIGNING AUTHORITY INFORMATION....12–2

THIS PAGE INTENTIONALLY LEFT BLANK

1. INTRODUCTION

1.1 OVERVIEW

This DICOM Conformance Statement is divided into Sections as described below:

Section 1 (Introduction) describes the overall structure, intent, and references for this Conformance Statement.

Section 2 (Network Conformance Statement) specifies the Centricity PACS compliance to DICOM requirements for the implementation of Networking features.

Section 3 (Media Storage Conformance Statement) specifies the Centricity PACS compliance to the DICOM requirements for the implementation of Media Storage features.

Section 4 (Grayscale Softcopy Presentation State IOD Implementation) which specifies the Centricity PACS compliance to DICOM requirements for the implementation of a Grayscale Softcopy Presentation State Information Object.

Section 5 (Key Object Selection Document IOD Implementation) which specifies the Centricity PACS compliance to DICOM requirements for the implementation of a Key Object Selection Document Information Object.

Section 6 (Modality Performed Procedure Step Implementation) which specifies the Centricity PACS compliance to DICOM requirements for the implementation of Modality Performed Procedure Step.

Section 7 (Instance Availability Notification Implementation) which specifies the Centricity PACS compliance to DICOM requirements for the implementation of Instance Availability Notification.

Section 8 (Storage Commitment Push Model Implementation) which specifies the Centricity PACS compliance to DICOM requirements for the implementation of the Storage Commitment Push Model.

Section 9 (Print Management Implementation) which specifies the Centricity PACS compliance to DICOM requirements for the implementation of Print Management.

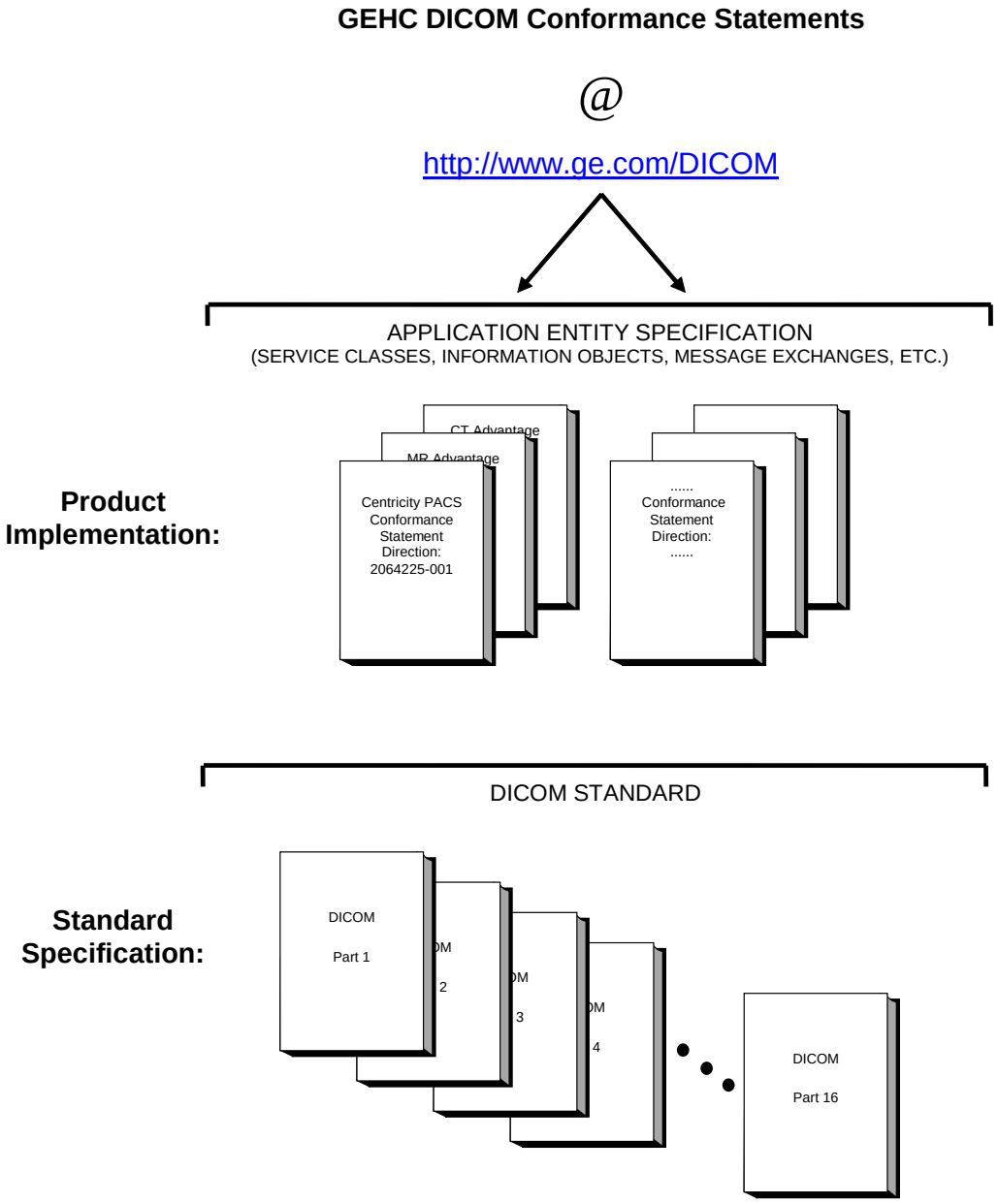
Section 10 (Query Implementation) specifies the compliance of the Centricity PACS compliance to DICOM requirements for the implementation of Storage Query.

Section 11 (General Purpose Worklist Implementation) which specifies the Centricity PACS compliance to DICOM requirements for the implementation of General Purpose Worklist.

Section 12 (Private Attributes Implementation) specifies the usage of private attributes by Centricity PACS for storage SOP instances managed by the storage implementation.

1.2 OVERALL DICOM CONFORMANCE STATEMENT DOCUMENT STRUCTURE

The Documentation Structure of the GE Conformance Statements and their relationship to the DICOM Conformance Statements is shown in the illustration below.



This document specifies the DICOM implementation supported by Centricity PACS. It is entitled:

Centricity PACS Version 7.0

DICOM Conformance Statement

This DICOM Conformance Statement documents the DICOM Conformance Statement and Technical Specification required interoperating with the GEHC network interface.

The GEHC Conformance Statement, contained in this document, also specifies the Lower Layer communications, which it supports (e.g., TCP/IP). However, the Technical Specifications are defined in the DICOM Part 8 standard.

This DICOM Conformance Statement document does not include the DICOM Conformance Statements for the Centricity Enterprise Archive or Centricity Enterprise Web. These Conformance Statements are available as separate documents. Refer to the GE Web Site: http://www.ge.com/dicom.

For more information regarding the DICOM Standard, copies of the Standard may be obtained on the Internet at http://medical.nema.org. Comments on the Standard may be addressed to:

DICOM Secretariat
NEMA
1300 North 17th Street, Suite 1847
Rosslyn, VA 22209
USA
Phone: +1.703.841.3200

1.3 INTENDED AUDIENCE

The reader of this document is concerned with software design and/or system integration issues. It is assumed that the reader of this document is familiar with the DICOM Standard and with the terminology and concepts that are used in that Standard.

1.4 SCOPE AND FIELD OF APPLICATION

It is the intent of this document, to provide an unambiguous specification for GEHC implementations. This specification, called a Conformance Statement, includes a DICOM Conformance Statement and is necessary to ensure proper processing and interpretation of GEHC medical data exchanged using DICOM. The GEHC Conformance Statements are available to the public.

The reader of this DICOM Conformance Statement should be aware that different GEHC devices are capable of using different Information Object Definitions. For example, a GEHC CT Scanner may send images using the CT Information Object, MR Information Object, Secondary Capture Object, etc.

Included in this DICOM Conformance Statement are the Module Definitions, which define all data elements, used by this GEHC implementation. If the user encounters unspecified private data elements while parsing a GEHC Data Set, the user is well advised to ignore those data

elements (per the DICOM standard). Unspecified private data element information is subject to change without notice. If, however, the device is acting as a "full fidelity storage device", it should retain and re-transmit all of the private data elements which are sent by GEHC devices.

1.5 IMPORTANT REMARKS

The use of these DICOM Conformance Statements, in conjunction with the DICOM Standards, is intended to facilitate communication with GEHC imaging equipment. However, **by itself, it is not sufficient to ensure that inter-operation will be successful**. The **user (or user's agent)** needs to proceed with caution and address at least four issues:

Integration - The integration of any device into an overall system of interconnected devices goes beyond the scope of standards (DICOM v3.0), and of this introduction and associated DICOM Conformance Statements when interoperability with non-GEHC equipment is desired. The responsibility to analyze the applications requirements and to design a solution that integrates GE imaging equipment with non–GEHC systems is the **user's** responsibility and should not be underestimated. The **user** is strongly advised to ensure that such an integration analysis is correctly performed.

Validation - Testing the complete range of possible interactions between any GEHC device and non–GEHC devices, before the connection is declared operational, should not be overlooked. Therefore, the **user** should ensure that any non–GEHC provider accepts full responsibility for all validation required for their connection with GEHC devices. This includes the accuracy of the image data once it has crossed the interface between the GEHC imaging equipment and the non–GEHC device and the stability of the image data for the intended applications.

Such a validation is required before any clinical use (diagnosis and/or treatment) is performed. It applies when images acquired on GEHC imaging equipment are processed/displayed on a non-GEHC device, as well as when images acquired on non-GEHC equipment is processed/displayed on a GEHC console or workstation.

Future Evolution – GEHC understands that the DICOM Standard will evolve to meet the user's growing requirements. GEHC is actively involved in the development of the DICOM Standards. DICOM will incorporate new features and technologies and GEHC may follow the evolution of the Standard. The GEHC protocol is based on DICOM as specified in each DICOM Conformance Statement. Evolution of the Standard may require changes to devices which have implemented DICOM. **In addition, GEHC reserves the right to discontinue or make changes to the support of communications features, on its products, as described by these DICOM Conformance Statements**. The **user** should ensure that any non–GEHC provider, which connects with GEHC devices, also plans for the future evolution of the DICOM Standards. Failure to ensure this could likely result in the loss of function and/or connectivity as the DICOM Standards change and GEHC products are enhanced to support these changes.

Interaction - It is the sole responsibility of the **non–GEHC provider** to ensure that communication with the interfaced equipment does not cause degradation of GEHC imaging equipment performance and/or function.

1.6 REFERENCES

Additional references used in this Conformance Statement document are listed in Table 1-1.

TABLE 1-1. ADDITIONAL REFERENCE DOCUMENTS

Document Name	Organization	Document Number(s)
Digital Imaging and Communications in Medicine (DICOM), 2015a Edition.	National Electrical Manufacturers Association (NEMA)	NEMA PS3
ASCII Graphic Character Set. ISO 646, USA Version X3.4 - 1968	Information Processing Society of Japan/Information Technology Standards Commission of Japan (IPSJ/ITSCJ)	ISO-IR-6
Japanese Katakana Character Set JIS C6220-1969	IPSJ/ITSCJ	ISO-IR-13
Japanese Version of ISO 646 for Roman Characters JIS C6220-1969	IPSJ/ITSCJ	ISO-IR-14
Japanese Character Set JIS C 6226-1983	IPSJ/ITSCJ	ISO-IR-87
96-Character Graphic Character Set. Right-hand Part of Latin Alphabet No.1 ISO 8859/1, ECMA-94	IPSJ/ITSCJ	ISO-IR-100
Korean Graphic Character Set, Korean Standard KSC 5601-1987	IPSJ/ITSCJ	ISO-IR-149
CCITT Chinese Set	IPSJ/ITSCJ	ISO-IR-165
Centricity Clinical Gateway v9.2.0 DICOM Conformance Statement	GE Healthcare	DOC1117304

1.7 DEFINITIONS

Informal definitions are provided for the following terms used in this Conformance Statement. The DICOM Standard is the authoritative source for formal definitions of these terms.

Abstract Syntax – the information agreed to be exchanged between applications, generally equivalent to a Service/Object Pair (SOP) Class. Examples: Verification SOP Class, Modality Worklist Information Model Find SOP Class, Computed Radiography Image Storage SOP Class.

Application Entity (AE) – an end point of a DICOM information exchange, including the DICOM network or media interface software; i.e., the software that sends or receives DICOM information objects or messages. A single device may have multiple Application Entities.

Application Entity Title – the externally known name of an Application Entity, used to identify a DICOM application to other DICOM applications on the network.

Application Context – the specification of the type of communication used between Application Entities. Example: DICOM network protocol.

Association – a network communication channel set up between Application Entities.

Attribute – – a unit of information in an object definition; a data element identified by a tag. The information may be a complex data structure (Sequence), itself composed of lower level data elements. Examples: Patient ID (0010,0020), Accession Number (0008,0050), Photometric Interpretation (0028,0004), Procedure Code Sequence (0008,1032).

DICOM Server - "The DICOM Server" refers to all of its DICOM Application Entities for their common properties and behaviors. The DICOM Server is a software module of Centricity PACS and runs on the Centricity PACS DAS (DICOM Application Server) subsystem.

Information Object Definition (IOD) – the specified set of Attributes that comprise a type of data object; does not represent a specific instance of the data object, but rather a class of similar data objects that have the same properties. The Attributes may be specified as Mandatory (Type 1), Required but possibly unknown (Type 2), or Optional (Type 3), and there may be conditions associated with the use of an Attribute (Types 1C and 2C). Examples: MR Image IOD, CT Image IOD, Print Job IOD.

Joint Photographic Experts Group (JPEG) – a set of standardized image compression techniques, available for use by DICOM applications.

Media Application Profile – the specification of DICOM information objects and encoding exchanged on removable media (e.g., CDs)

Module – a set of Attributes within an Information Object Definition that are logically related to each other. Example: Patient Module includes Patient Name, Patient ID, Patient Birth Date, and Patient Sex.

Negotiation – first phase of Association establishment that allows Application Entities to agree on the types of data to be exchanged and how that data will be encoded.

Presentation Context – the set of DICOM network services used over an Association, as negotiated between Application Entities; includes Abstract Syntaxes and Transfer Syntaxes.

Protocol Data Unit (PDU) – a packet (piece) of a DICOM message sent across the network. Devices must specify the maximum size packet they can receive for DICOM messages.

Security Profile – a set of mechanisms, such as encryption, user authentication, or digital signatures, used by an Application Entity to ensure confidentiality, integrity, and/or availability of exchanged DICOM data

Service Class Provider (SCP) – role of an Application Entity that provides a DICOM network service; typically, a server that performs operations requested by another Application Entity (Service Class User). Examples: Picture Archiving and Communication System (image storage SCP, and image query/retrieve SCP), Radiology Information System (modality worklist SCP).

Service Class User (SCU) – role of an Application Entity that uses a DICOM network service; typically, a client. Examples: imaging modality (image storage SCU, and modality worklist SCU), imaging workstation (image query/retrieve SCU)

Service/Object Pair (SOP) Class – the specification of the network or media transfer (service) of a particular type of data (object); the fundamental unit of DICOM interoperability specification. Examples: Ultrasound Image Storage Service, Basic Grayscale Print Management.

Service/Object Pair (SOP) Instance – an information object; a specific occurrence of information exchanged in a SOP Class. Examples: a specific x-ray image.

Tag – a 32-bit identifier for a data element, represented as a pair of four digit hexadecimal numbers, the "group" and the "element". If the "group" number is odd, the tag is for a private (manufacturer-specific) data element. Examples: (0010,0020) [Patient ID], (07FE,0010) [Pixel Data], (0019,0210) [private data element]

Transfer Syntax – the encoding used for exchange of DICOM information objects and messages. Examples: JPEG compressed (images), little endian explicit value representation.

Unique Identifier (UID) – a globally unique "dotted decimal" string that identifies a specific object or a class of objects; an ISO-8824 Object Identifier. Examples: Study Instance UID, SOP Class UID, SOP Instance UID.

Value Representation (VR) – the format type of an individual DICOM data element, such as text, an integer, a person's name, or a code. DICOM information objects can be transmitted with either explicit identification of the type of each data element (Explicit VR), or without explicit identification (Implicit VR); with Implicit VR, the receiving application must use a DICOM data dictionary to look up the format of each data element.

1.8 SYMBOLS, TERMS AND ABBREVIATIONS

Additional abbreviations and terms used in this Conformance Statement document are listed below:

TERM	DESCRIPTION
CDPS	Centricity DICOM Print Server
DAS	DICOM Application Server
GP-PPS	General Purpose Performed Procedure Steps
GP-SPS	General Purpose Scheduled Procedure Steps
GPWL	General Purpose Worklist
IAN	Instance Availability Notification
MPPS	Modality Performed Procedure Step
PACS	Picture Archiving and Communications System
Q/R	Query/Retrieve
RIS	Radiology Information System
UL service-provider	DICOM Upper Layer Service Provider
UL service-user	DICOM Upper Layer Service User
WKS	Workstation

2. NETWORK CONFORMANCE STATEMENT

2.1 INTRODUCTION

Centricity PACS provides (image and non-image) data management and archival services. It implements DICOM Application Server (denoted DAS for short in this document) for the following services to external systems (e.g., acquisition modalities, review workstations, etc.):

- Receive DICOM Storage SOP Instances from an acquisition modality for data storage.
- Service long-term Storage Commitment requests for the SOP Instances. These SOP Instances can be already sent to the PACS previously or delivered at a later time after the Storage Commitment Request.
- Send DICOM Storage SOP Instances to an external system for data distribution.
- Service information query and data retrieval to the Patient / Study / Series / SOP Instances maintained in the Centricity PACS system.
- Initiate information query and data retrieval to the Patient / Study / Series / SOP Instances maintained in another DICOM entity and load them into the Centricity PACS system.

The DAS creates a DICOM Application Entity (AE) to support these services.

Centricity PACS also supports the DICOM Print as SCU. The DICOM Print Service has been implemented in a separate subsystem other than the DAS. Section 2.3.3 includes a complete DICOM Standards Conformance Statement for the Print Service.

Note: In this document, we use the term “DICOM Storage SOP Instance” or “SOP Instance” in places where the term “Image” is usually used. A SOP Instance generally refers to a DICOM Standards Composite IOD, which can be an image or non-image data set. The SOP class to which an instance is associated determines the data type of the instance in the most cases. For more details, the reader is referred to DICOM PS 3.3 and PS 3.4.

Centricity PACS supports a RIS interface to receive study orders as well as patient / study updates. Alternatively, the Centricity PACS Exam Manager operator can also create a study order directly in the database. The Centricity Clinical Gateway supports a DICOM Modality Worklist information query of the ordered studies from an acquisition modality. The modality includes the patient / study information received in the query responses to the DICOM Storage SOP instances it generates and sends these to the DAS.

After receiving the DICOM SOP instances, the DAS AE will match the SOP instances to the associated study in the Centricity PACS database, using the patient / study information embedded in the data sets of the instances. Using the worklist query is highly recommended for all acquisition modalities. If a modality cannot support the worklist query, it usually relies on the operator’s input for the patient / study information. Without the use of a Modality

Worklist, manual errors increase the number of mismatching SOP instances to the studies in the Centricity PACS database significantly.

A block diagram of the GE PACS System is shown in Figure 2-1.

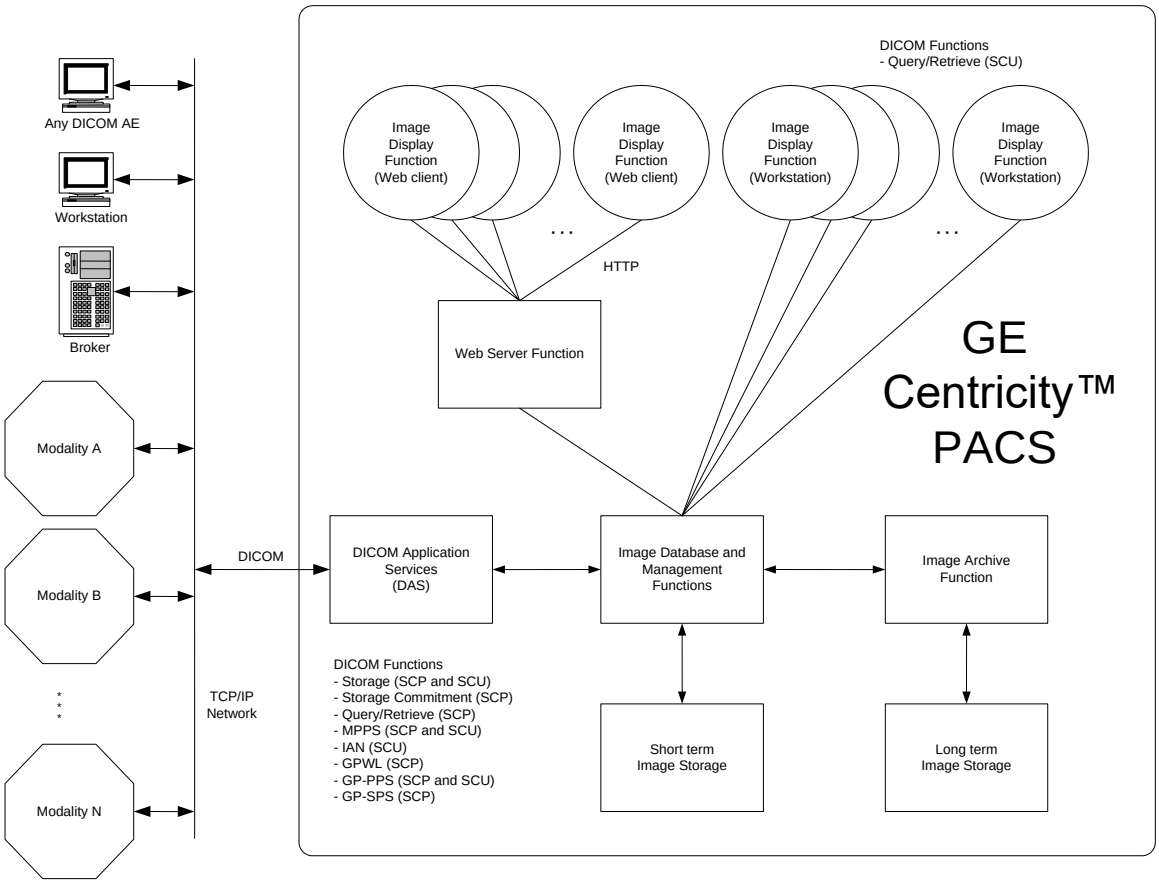


FIGURE 2-1, BLOCK DIAGRAM OF GE CENTRICITY PACS SYSTEM

2.2 IMPLEMENTATION MODEL

Centricity PACS provides a number of DICOM Standard as well as private services with separate DICOM Application Entities (AEs):

- DICOM Application Server (DAS) AE
    - SOP Instance Storage and Commitment
    - SOP Instance Storage Send
    - Information Query and Data Retrieve as an SCP
    - General Purpose Worklist
- RA1000 Query/Retrieve AE

- Information Query and Data Retrieve as an SCU

- Centricity DICOM Print Server (CDPS) AE
  - Basic Grayscale Print Management as an SCU

In this document, the term The "DAS AE" refers to its DICOM Application Entity and supported services for their common properties and behaviors. The DAS is a software module of Centricity PACS and runs on the Centricity PACS DAS (DICOM Application Server) subsystem.

The DAS AE is automatically started when the Centricity PACS DAS is booted.

The following subsections give the implementation data flow diagrams of these AEs.

2.2.1 Application Data Flow Diagrams

2.2.1.1 Application Data Flow Diagrams of DICOM Application Server (DAS) AE

The DAS AE supports several services in both the SCP and SCU roles. SCP role services respond to external real-world events, such as a remote AE sending DICOM storage SOP instances to Centricity PACS, or responding to query and retrieve requests.

SCU role services respond to local events, typically generated by Centricity PACS applications such as the RA1000 workstation and queued in the Centricity PACS database for outbound transfer to a remote AE.

2.2.1.1.1 Application Data Flow Diagrams of DAS AE Storage Services

2.2.1.1.1.1 Application Data Flow Diagram of DAS AE – Storage Provider

The DAS AE Storage Provider implements the SCP role of the DICOM Storage SOP Class and the DICOM Storage Commitment SOP Class.

The SCP role of the DICOM Storage SOP Class is responsible for receiving DICOM Storage SOP Instances from a remote AE.

The SCP role of the DICOM Storage Commitment SOP Class is responsible for the support of long-term Storage Commitment Request from a remote AE.

There is no local real-world activity required for the DAS AE to respond incoming DICOM associations to receive SOP Instances and/or Storage Commitment Requests. The DAS AE is always waiting for an incoming association and will automatically respond a Verification request.

After receiving a SOP Instance, the DAS AE will start the following local real-world activities:

- Match the received SOP Instances to an ordered study, or create a new study (unordered study) if no match is found. This is referred to as the Study Profiling procedure, see Section 2.3.1.4.1.

Store the received SOP Instances in the Centricity PACS storage system, for use within Centricity PACS and for archiving.

Note: The DAS AE always saves the successfully received SOP Instances, so that they will be archived. However, the DAS AE does not guarantee that the data will be archived. The remote AE submitting data to the DAS AE should verify the data archiving commitment by sending a Storage Commitment Request– in the same association it sent the SOP Instances or in another dedicated, separate association.

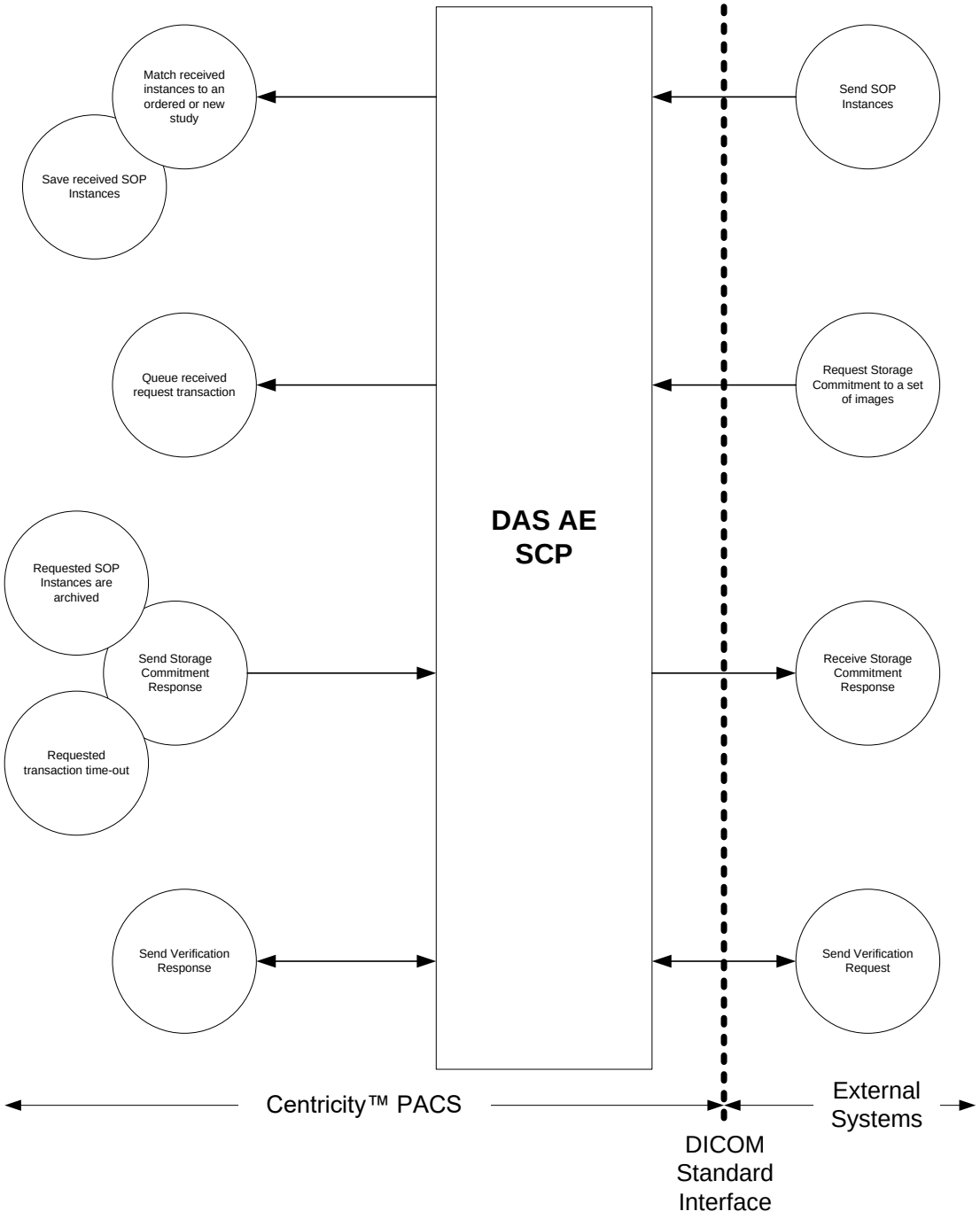

Match received instances to an ordered or new study
Save received SOP Instances
Send SOP Instances
Queue received request transaction
Request Storage Commitment to a set of images
DAS AE SCP
Requested SOP Instances are archived
Send Storage Commitment Response
Receive Storage Commitment Response
Requested transaction time-out
Send Verification Response
Send Verification Request
Centricity™ PACS
External Systems
DICOM Standard Interface

FIGURE 2-2. DATA FLOW DIAGRAM OF DAS AE – STORAGE PROVIDER

After receiving a Storage Commitment Request, the request transaction is queued into the Centricity PACS database (Storage Commitment Queue) and a timer of a configured time-out value (see Section 2.7.5) associated with the transaction is started. The DAS AE periodically polls

all outstanding Storage Commitment Transactions in the queue, and will send a Storage Commitment Result back to the remote AE in the following two cases:

- All images requested in one outstanding, queued Storage Commitment transaction have been successfully archived in the long-term archiving media.
- The pre-configured time-out is expired, but not all images requested in one outstanding, queued Storage Commitment transaction have been successfully archived.

The DAS AE supports a Storage Commitment Request for the SOP Instances unknown to the Centricity PACS at the moment that the request is received. The DAS AE assumes that these SOP Instances will be received at a later time.

2.2.1.1.1.2 Application Data Flow Diagram of DAS AE – MPPS Provider

The DAS AE also supports the Modality Performed Procedure Step SOP Class as an SCP, as shown in the following figure:

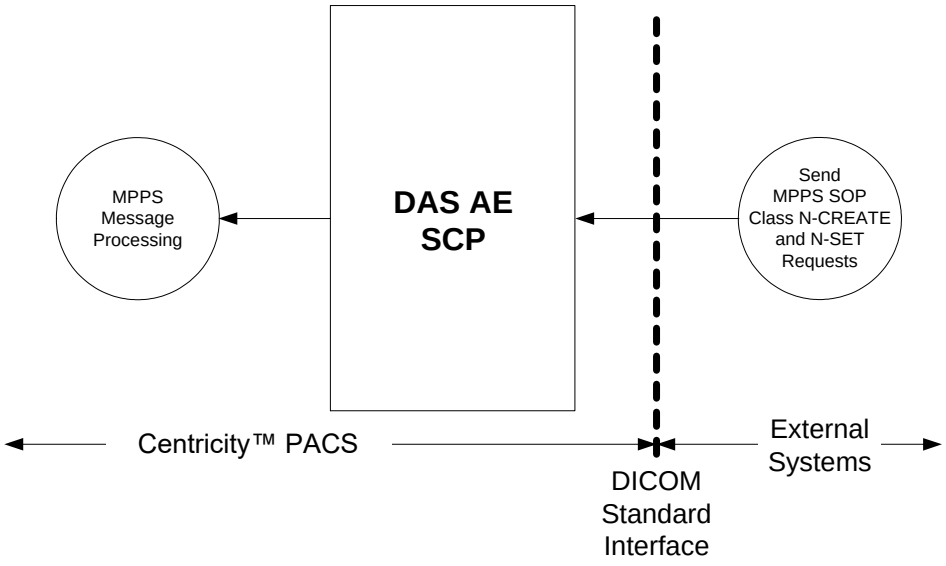


FIGURE 2-3. DATA FLOW DIAGRAM OF DAS AE – MPPS PROVIDER

2.2.1.1.2 Application Data Flow Diagrams of DAS AE Send Services

2.2.1.1.2.1 Application Data Flow Diagram of DAS AE – Storage Send

The DAS AE implements the SCU roles of the DICOM Storage SOP Classes for sending DICOM Storage SOP Instances to a remote AE.

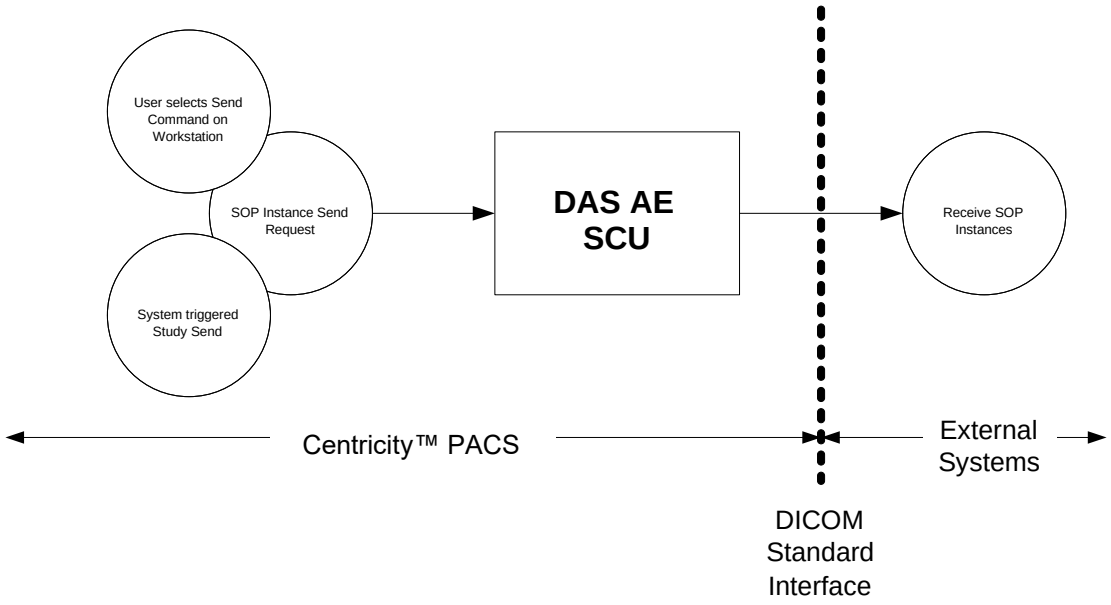


FIGURE 2-4. DATA FLOW DIAGRAM OF DAS AE – STORAGE SEND

There are two real-world activities, which will cause the DAS AE to initiate a DICOM association to a remote DICOM AE for sending SOP Instances:

A user selected the "Send Exam" command on the Centricity PACS RA1000 Workstation for a specified study to a specified destination DICOM AE.

- A study changed its status to a particular value, which is pre-configured in the Centricity PACS to trigger a DICOM Send of the study to a specified destination DICOM AE.

Note: The trigger mechanism and the configuration method for these triggers are beyond the scope of this document.

2.2.1.1.2.2 Application Data Flow Diagram of DAS AE – MPPS Forwarder

The DAS AE implements the SCU role of the Modality Performed Procedure Step SOP Class as a configurable option for the purpose of message forwarding to external systems such as RIS as shown in Figure 2-5.

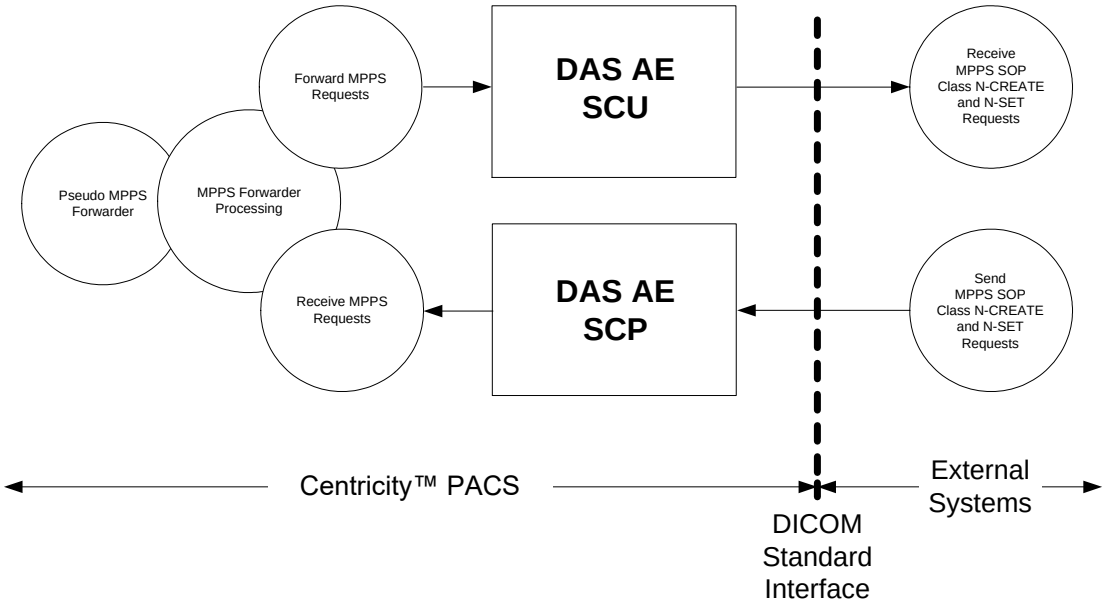


FIGURE 2-5. DATA FLOW DIAGRAM OF DAS AE – MPPS FORWARDER

2.2.1.1.2.3 Application Data Flow Diagram of DAS AE – GP-PPS Forwarder

The DAS AE implements the SCU role of the General Purpose Performed Procedure Step SOP Class as a configurable option for the purpose of message forwarding to external systems such as RIS as shown in Figure 2-6.

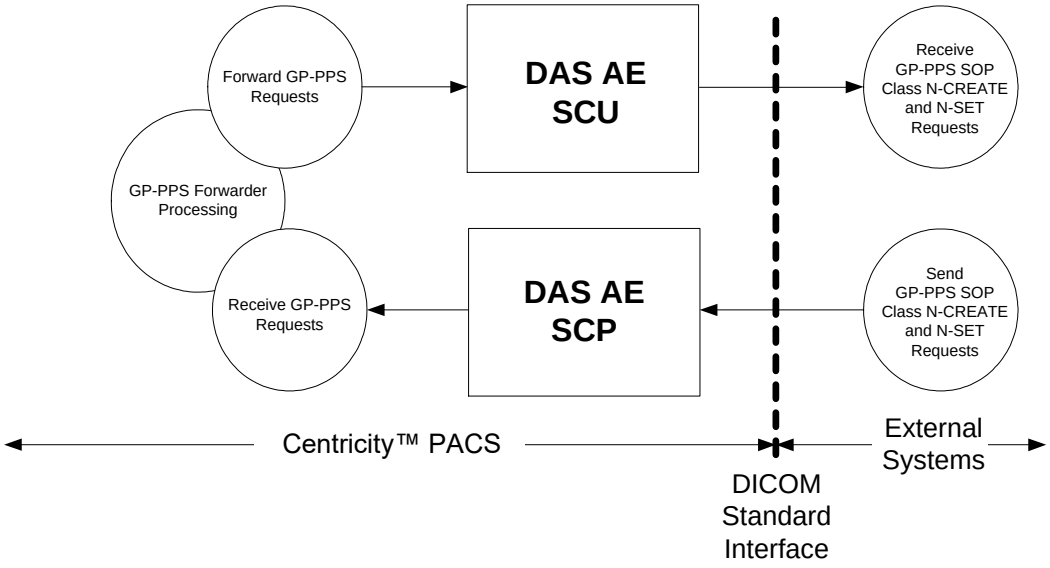


FIGURE 2-6. DATA FLOW DIAGRAM OF DAS AE – GP-PPS FORWARDER

2.2.1.1.2.4 Application Data Flow Diagram of DAS AE – IAN Send

The DAS AE implements the SCU role of the Instance Availability Notification SOP Class as a configurable option as shown in Figure 2-7.

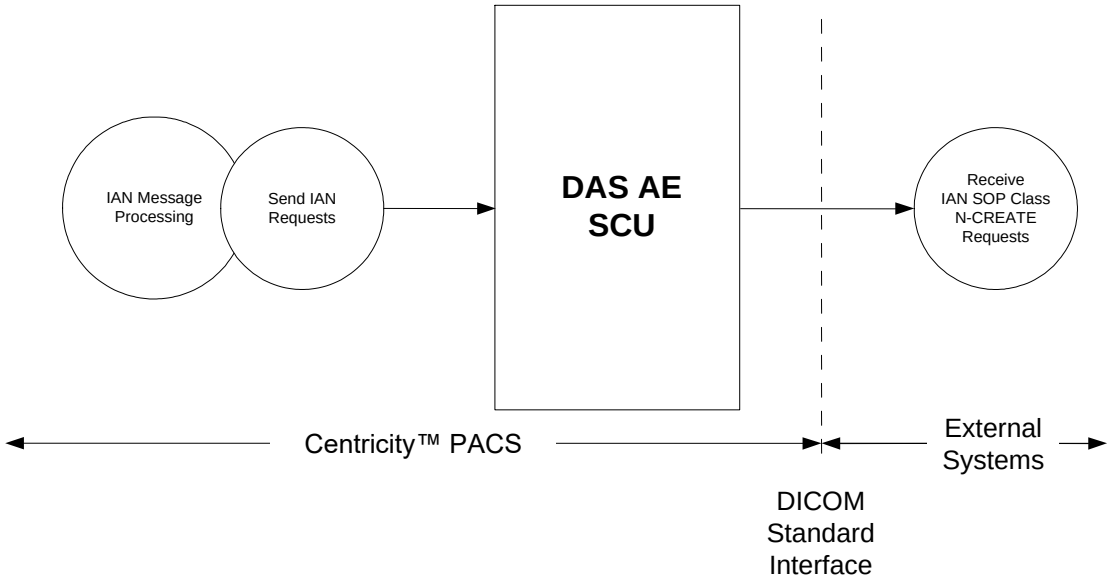


FIGURE 2-7. DATA FLOW DIAGRAM OF DAS AE – IAN SEND

2.2.1.1.3 Application Data Flow Diagram of DAS AE Q/R Provider

The DAS AE implements the SCP role of the DICOM Query/Retrieve SOP Classes for a remote AE to query the Patient / Study / Series / SOP Instance information, as well as to retrieve the SOP Instances from Centricity PACS.

As the DICOM Query/Retrieve SCP for data retrieval, the DAS AE also implements the SCU role of the Storage SOP Classes for the SOP Instances move sub-operations.

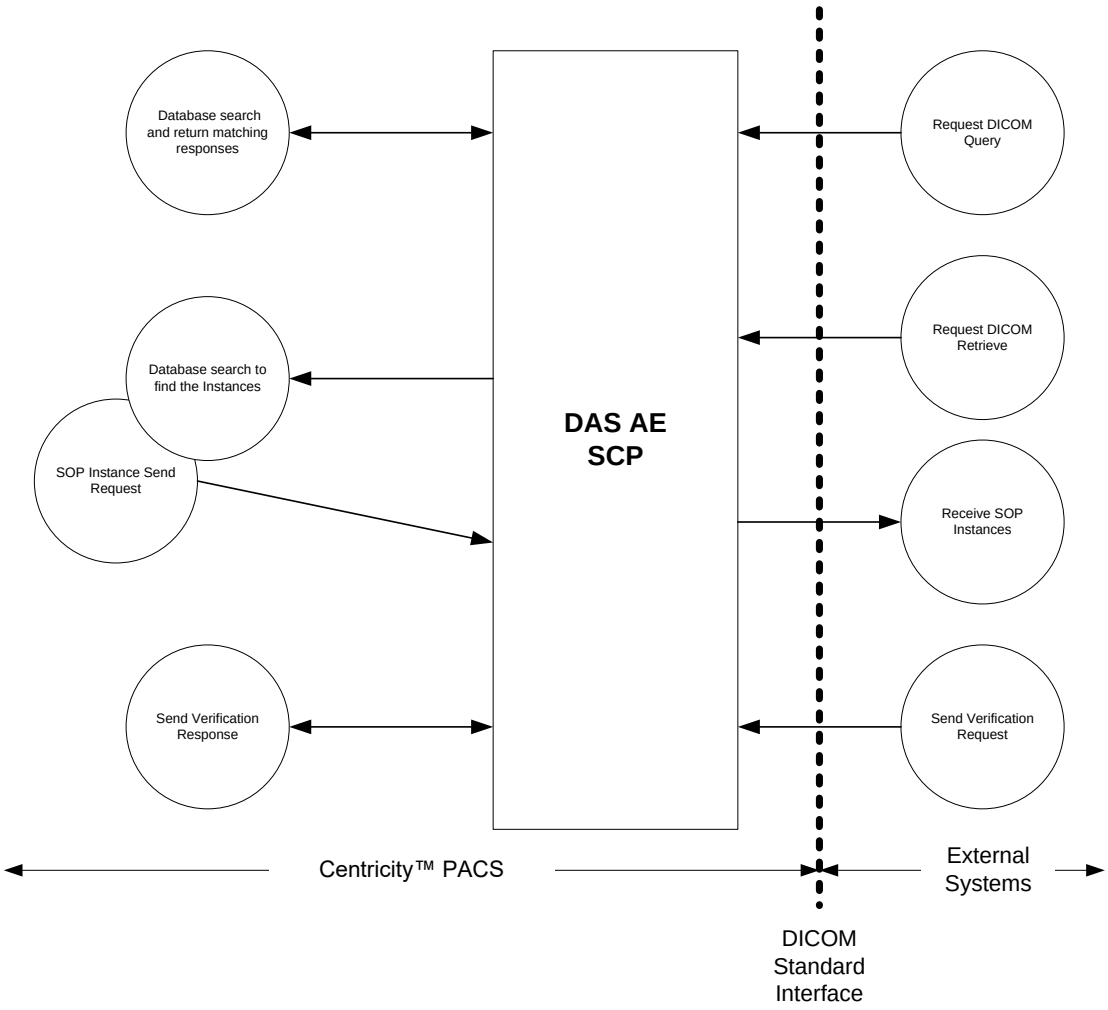


FIGURE 2-8. DATA FLOW DIAGRAM OF DAS AE – Q/R PROVIDER

There is no real-world activity required for the DAS AE to respond to incoming DICOM associations for DICOM Query and Retrieve. The DAS AE is always waiting for an incoming association and will automatically respond to a DICOM Verification request.

After receiving a DICOM Query request, the DAS AE will start the following local real-world activities:

Search for the requested data attributes on the Patient / Study / Series / SOP Instance levels in the Centricity PACS database, as specified in the Query request and using the matching criteria specified in the Query request.

Return all matching responses.

After receiving a DICOM Retrieve request, the DAS AE will start the following local real-world activities:

Search for the SOP Instances records on the Patient / Study / Series / SOP Instance level in the Centricity PACS database, as specified in the Retrieve request and using the matching criteria specified in the Retrieve request.

Locate the data files of the found SOP Instances in the Centricity PACS storage sub-system. Fetch the data from the long-term archiving sub-system if necessary.

If the data files can be located, initiate a separate DICOM association to send these files to the destination AE as specified in the received Retrieve request.

2.2.1.1.4 Application Data Flow Diagram of DAS AE GPWL Provider

The DAS AE implements the SCP role of the DICOM General Purpose Worklist SOP Classes for a remote AE to query the General Purpose Schedule Procedure Steps, as well as to claim the GP-SPS message from Centricity PACS to work upon.

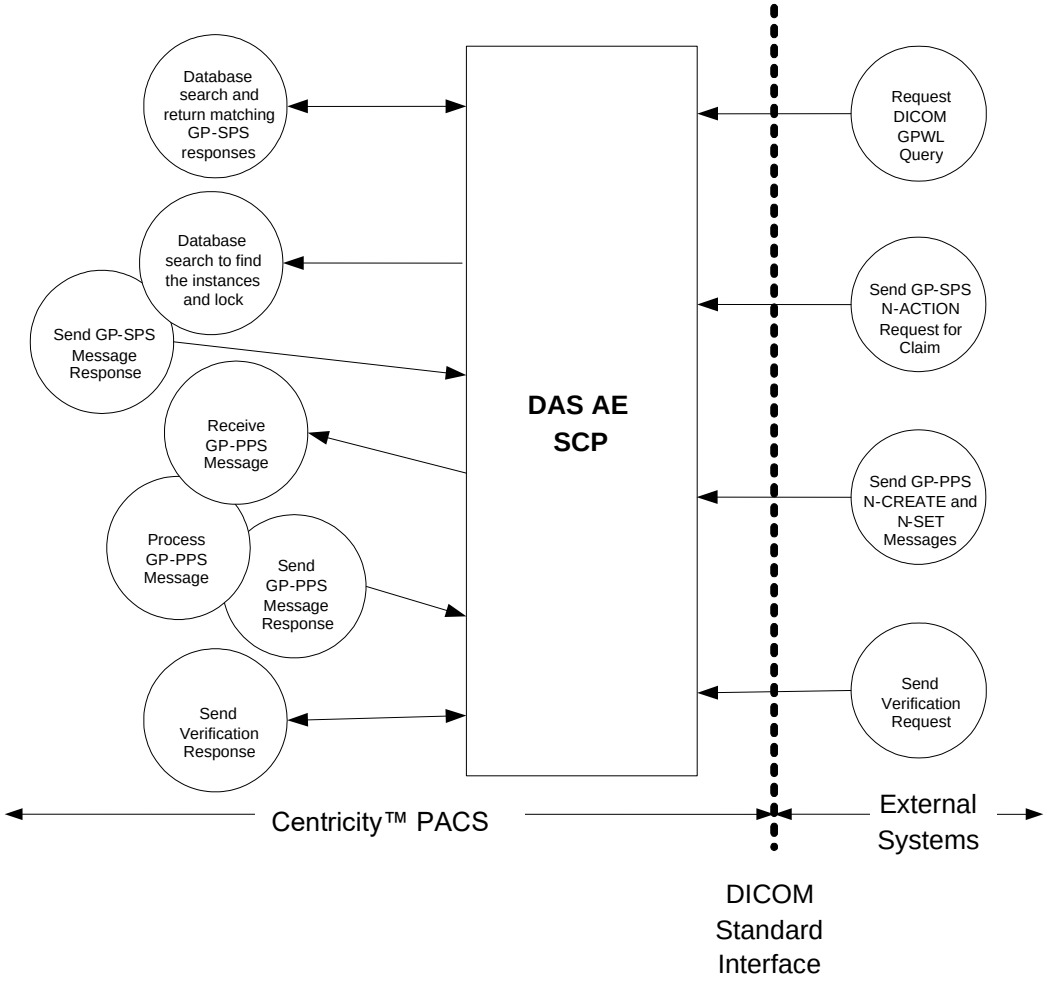

Database search and return matching GP-SPS responses
Database search to find the instances and lock
Send GP-SPS Message Response
Receive GP-PPS Message
Process GP-PPS Message
Send GP-PPS Message Response
Send Verification Response
DAS AE SCP
Request DICOM GPWL Query
Send GP-SPS N-ACTION Request for Claim
Send GP-PPS N-CREATE and N-SET Messages
Send Verification Request
Centricity™ PACS
External Systems
DICOM Standard Interface

FIGURE 2-9. DATA FLOW DIAGRAM OF DAS AE– GPWL PROVIDER

There is no real-world activity required for the DAS AE to respond to incoming DICOM associations for DICOM General Purpose Worklist. The DAS AE is always waiting for an incoming association and will automatically respond to a DICOM Verification request.

After receiving a DICOM General Purpose Worklist request, the DAS AE will start the following local real-world activities:

- Search for the requested data attributes in the Centricity PACS database, as specified in the Query request and using the matching criteria specified in the Query request.
- Construct the General Purpose Scheduled Procedure Steps messages.
- Return all GP-SPS messages.

After receiving a DICOM General Purpose Schedule Procedure Step request, the DAS AE will start the following local real-world activities:

- Process the GP-SPS message and validate the state of Workitem, which it is transitioning.
- Search the correct Workitem and lock the workitems which have the status of "SCHEDULED"
- Based on the Status of GP-SPS locates the workitems with the status of INPROGRESS update the status of Workitem appropriately.

After receiving a DICOM General Purpose Performed Procedure Step request, the DAS AE will start the following local real-world activities:

- Receive a DICOM General Purpose Performed Procedure Step SOP Class N-CREATE request and create a GP-PPS object in Centricity PACS.
- Receive one or more DICOM General Purpose Performed Procedure Step SOP Class N-SET requests and update the requested GP-PPS object in Centricity PACS, as long as the GP-PPS object status has not reached a final state of "COMPLETED" or "DISCONTINUED".

2.2.1.2 Application Data Flow Diagram of Centricity PACS RA1000 AE

The RA1000 AE implements the SCU role of the DICOM Query/Retrieve SOP Classes for the Centricity PACS RA1000 Workstation to query a remote AE for Patient / Study / Series / SOP Instance information, as well as to retrieve the SOP Instances from the remote AE.

The RA1000 AE works in conjunction with the DAS AE to retrieve the SOP Instances into Centricity PACS.

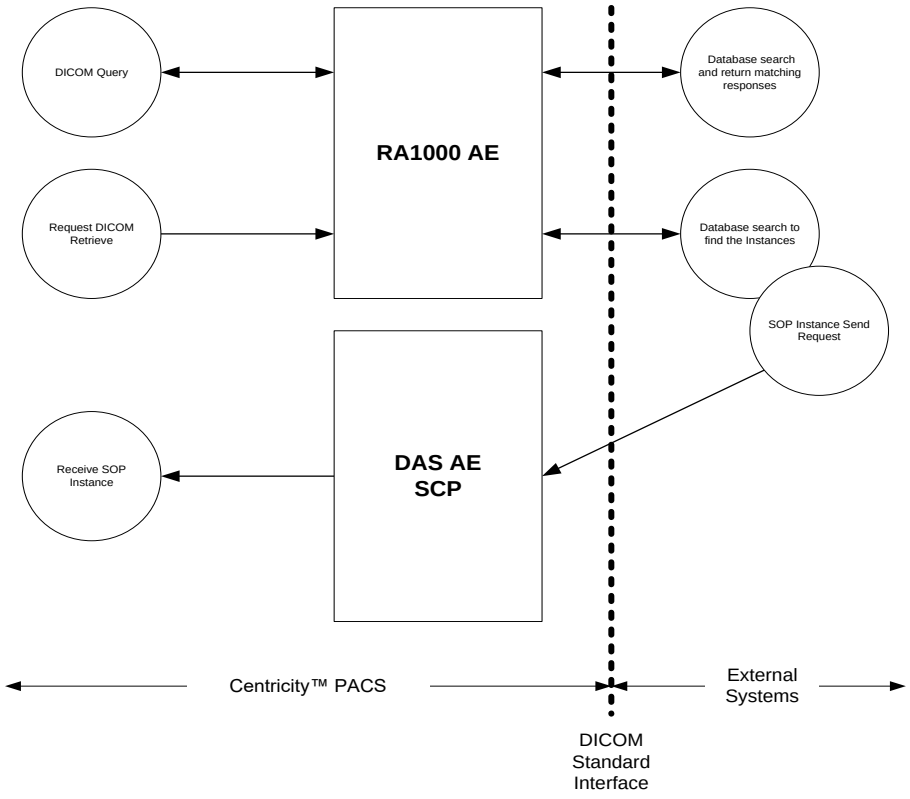


FIGURE 2-10. DATA FLOW DIAGRAM OF RA1000 AE FUNCTIONALITY

There are real-world activities, which will cause the RA1000 AE to initiate a DICOM association to a remote DICOM AE for querying the remote AE's database and retrieving studies or series from the remote AE:

- A user opens up the Query/Retrieve dialog box on the Centricity PACS RA1000 Workstation, selects a specific destination DICOM AE, enters search criteria data into key attribute fields and selects the "Query" button on the Centricity PACS RA1000 Workstation. The query can only be done at the Study level.
- The destination DICOM AE responds with none, one, or more exams that match the search criteria.

After issuing the DICOM Query request, the RA1000 AE will allow the following local real-world activities:

- A user will select a specific study or series from the matched results returned by the specified destination DICOM AE, and then select the "Retrieve" button on the Centricity PACS RA1000 Workstation.
- The destination DICOM AE responds by sending the selected study to the Centricity PACS.

2.2.1.3 Application Data Flow Diagram of Centricity DICOM Print Server (CDPS) AE

The CDPS AE implements the SCU role of the DICOM Basic Grayscale Print Management Meta SOP Class.

With this SCU role, the CDPS AE is able to retrieve the printer information, to accept printer status event report and to print images.

The real-world activity that triggers the CDPS AE to start an association for image print is an image print request issued by the Centricity PACS RA1000 Workstation user. However, the print job is performed in an asynchronous way, from the point of view of the Workstation user.

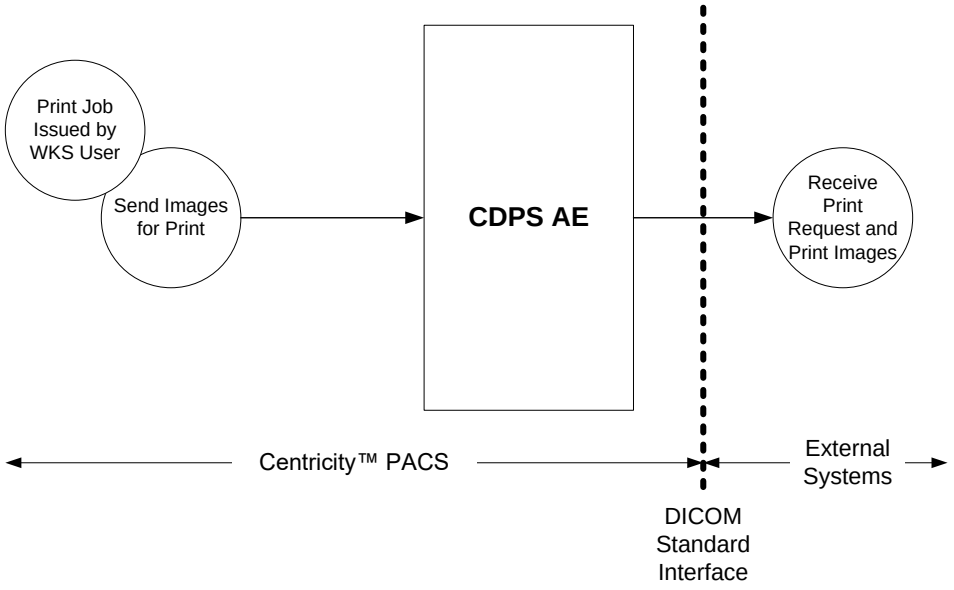


FIGURE 2-11. DATA FLOW DIAGRAM OF DICOM PRINT SERVER (CDPS) AE

When starting a print job, the CDPS AE attempts to send all images specified in the job to the DICOM Print SCP application for printing. The job will be removed, which indicates a successful completion of the job, only after all images are sent.

Note: With each print job performed, the CDPS AE successfully sends all images as well as print formatting information specified in the job to the DICOM Print SCP application for printing. However, the CDPS AE cannot guarantee that these images are printed. The user should check the DICOM Conformance Statement of the Print SCP application for the specified actions after a successful completion of a DICOM association.

2.2.2 Functional Definitions of AEs

The DICOM Application Entities of Centricity PACS initiate or receive the DICOM associations to support a number of application functions for the PACS system.

2.2.2.1 DICOM Application Server (DAS) AE

2.2.2.1.1 Storage Services

The DAS AE Storage Services supports the following application-level functions:

- Receive SOP instances from a remote DICOM AE.
- Relate each received instance to an ordered / scheduled study in the Centricity PACS database by matching the Patient / Study information in the instance's data set to the information of the database.
- If no matching can be found, create a new (unordered) study by directly using the Patient / Study information in the received data set and relate the SOP instance to the created study.

Note: When relating a SOP Instance to an ordered study, the DAS AE may alter the values of some data elements using the values of the counterpart data fields of the matched study in the Centricity PACS database. In addition, the SOP Instances may be also changed by the Patient / Study update information received from RIS or entered by the Centricity PACS Exam Manager operator. Centricity PACS does not create a new SOP Instance for these data changes. A later DICOM Query or Retrieve request from remote AE will receive the SOP Instance with some data elements changed, or may not find the submitted SOP Instance if the changed data elements are used as the searching keys. A list of the data elements that may undergo data coercion is given in Section 2.3.1.4.2. Data coercion is performed for data correction purposes.

- Store the Patient, Study, Series, and SOP Instance relationship permanently in the Centricity PACS database.
- Store the SOP instances in the PACS storage system, for use within Centricity PACS and for long-term archiving.

Note: Centricity PACS will properly save and archive all SOP Instances successfully received via the DAS AE. However, Centricity PACS cannot guarantee that all received SOP Instances can be properly displayed and printed. Section 2.3.1.4.3.4 lists the SOP Instances that Centricity PACS RA1000 is able to display for the successfully received SOP Instances.

- Receive a DICOM Storage Commitment Request from a remote AE.
- Create a job (transaction) and add it in the Centricity PACS Storage Commitment Queue. The job is identified by the transaction UID in the received request and associated with a timer of a configurable time-out value (see Section 2.7.5).
- Poll the Storage Commitment Queue for a job, which is either completed or time-out.
- Send Storage Commitment Result to remote AE.
- Respond to a DICOM Verification (Echo) request from a remote AE.

- Receive a DICOM Modality Performed Procedure Step SOP Class N-CREATE request and create a MPPS object in Centricity PACS.
- Receive one or more DICOM Modality Performed Procedure Step SOP Class N-SET requests and update the requested MPPS object in Centricity PACS, as long as the MPPS object status has not reached a final state of "COMPLETED" or "DISCONTINUED".

2.2.2.1.2 Send Services

The DAS AE Send Services supports the following application-level functions:

- Send all SOP Instances of a study, which are maintained in Centricity PACS, to a remote AE.
- Send a specific series of a study and its associated SOP Instances, which are maintained in Centricity PACS, to a remote AE.
- Send a specific SOP Instance from a specific series of a study, which is maintained in Centricity PACS, to a remote AE.
- Forward all MPPS messages received by the DAS AE to one or more configured peer DICOM applications.
- Forward all GP-PPS messages received by the DAS AE to one or more configured peer DICOM applications.
- Send Instance Availability Notification (IAN) messages to one or more configured peer DICOM applications.

Note: Due to the data coercion, the SOP Instances sent to a remote AE may be different from the originally received SOP Instances in certain data elements. See Section 2.3.1.4.2 for possible data corrections in Centricity PACS.

2.2.2.1.3 Query/Retrieve Provider

The DAS AE Q/R Provider supports the following application-level functions:

- Receive a DICOM Query request at Patient / Study / Series / SOP Instance levels from a remote AE.
- Search for the data attributes in the Centricity PACS database that match the requested matching keys
- Respond to the remote AE by returning all matched data sets

Note: Due to the data coercion, the values of certain returned keys in the Query responses may be different from the values of the corresponding data element in the SOP Instances originally sent the DAS AE. See Section 2.3.1.4.2 for possible data corrections in Centricity PACS.

- Receive a DICOM Retrieve request at Patient / Study / Series / SOP Instance levels from a remote AE
- Find the requested SOP Instances in Centricity PACS, against both the on-line storage subsystem and the long-term archiving subsystem.
- Send the matched and found SOP Instances to the specified destination AE.

Note: Due to the data coercion, the SOP Instances moved to a remote AE may be different from the originally received SOP Instances in certain data elements. See Section 2.3.1.4.2 for possible data corrections in Centricity PACS.

2.2.2.1.4 GPWL Provider

The DAS AE GPWL Provider supports the following application-level functions:

- Receive a DICOM GPWL Query request from a remote AE.
- Search for the data attributes in the Centricity PACS database that match the requested matching keys
- Respond to the remote AE by returning all matched GP-SPS data sets which are online in storage.
- Receive a DICOM GP-SPS N-ACTION request for claiming a workitem from remote AE
- Search for the workitem in Centricity PACS database that match the GP-SPS SOP Instance UID and lock the workitem
- Receive one or more DICOM General Purpose Scheduled Procedure Step SOP Class N-ACTION requests with a status of “SUSPENDED” or “SCHEDULED” or “COMPLETED”, “DISCONTINUED”.
- Receive a DICOM General Purpose Performed Procedure Step SOP Class N-CREATE request and create a GP-PPS object in Centricity PACS.
- Receive one or more DICOM General Purpose Performed Procedure Step SOP Class N-SET requests and update the requested GP-PPS object in Centricity PACS, as long as the GP-PPS object status has not reached a final state of “COMPLETED” or “DISCONTINUED”.

2.2.2.2 Centricity PACS RA1000 AE

The RA1000 AE supports the following application-level functions:

- Generate a DICOM Query request at Study or Series levels to a remote AE.
- Receive all matched data sets from the remote AE.
- Generate a DICOM Retrieve request at Study or Series levels to a remote AE.

- Receive all matched and found SOP Instances from the remote AE and store into Centricity PACS via the DAS AE.

Note: The RA1000 AE SCU is implemented on the RA1000 workstation and is not available through the DAS AE application.

2.2.2.3 Centricity DICOM Printer Server (CDPS) AE

The CDPS AE supports the following application-level functions:

- Format a film sheet by filling the images into the film sheet according to the print format requested in the print job.
- Burn all (text and graphic) overlays into the image pixel data matrix.
- Perform all densitometry transforms to the image pixel data matrix as specified in the print job.
- Perform all spatial transforms to the image pixel data matrix as specified in the print job.
- Send the image pixel data matrix to the DICOM Print SCP application for print.

Note: Multiple CDPS instances can run in one Centricity PACS installation.

2.2.3 Sequencing of Real-World Activities

Not applicable.

2.3 AE SPECIFICATIONS

2.3.1 DAS AE

The DAS AE provides the Standard Conformance to the following DICOM Standard SOP Classes and Private SOP Classes as an SCU and SCP

TABLE 2-1
CONFORMANCE LIST OF SOP CLASSES FOR DAS AE

SOP Class Name	SOP Class UID	SCU	SCP
Verification (Echo)	1.2.840.10008.1.1	Yes	Yes
Storage Commitment Push Model	1.2.840.10008.1.20.1	No	Yes
Modality Performed Procedure Step	1.2.840.10008.3.1.2.3.3	Yes	Yes
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1	Yes	Yes
Digital X-Ray Image Storage (for presentation)	1.2.840.10008.5.1.4.1.1.1.1	Yes	Yes

SOP Class Name	SOP Class UID	SCU	SCP
Digital X-Ray Image Storage (for processing)	1.2.840.10008.5.1.4.1.1.1.1.1	Yes	Yes
Digital Mammography X-Ray Image Storage (for presentation)	1.2.840.10008.5.1.4.1.1.1.2	Yes	Yes
Digital Mammography X-Ray Image Storage (for processing)	1.2.840.10008.5.1.4.1.1.1.2.1	Yes	Yes
Digital Intra-oral X-Ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.1.3	Yes	Yes
Digital Intra-oral X-Ray Image Storage - For Processing	1.2.840.10008.5.1.4.1.1.1.3.1	Yes	Yes
Computed Tomography Image Storage	1.2.840.10008.5.1.4.1.1.2	Yes	Yes
Enhanced CT Image Storage	1.2.840.10008.5.1.4.1.1.2.1	Yes	Yes
Ultrasound Multi-Frame Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.3	Yes	Yes
Ultrasound Multi-Frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1	Yes	Yes
Magnetic Resonance Image Storage	1.2.840.10008.5.1.4.1.1.4	Yes	Yes
Enhanced MR Image Storage	1.2.840.10008.5.1.4.1.1.4.1	Yes	Yes
MR Spectroscopy Storage	1.2.840.10008.5.1.4.1.1.4.2	Yes	Yes
Nuclear Medicine Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.5	Yes	Yes
Ultrasound Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.6	Yes	Yes
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1	Yes	Yes
Enhanced US Volume Storage	1.2.840.10008.5.1.4.1.1.6.2	Yes	Yes
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	Yes	Yes
Multi-frame Grayscale Byte Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.2	Yes	Yes
Multi-Frame Grayscale Word Secondary Capture	1.2.840.10008.5.1.4.1.1.7.3	Yes	Yes
Multi-frame True Color Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.4	Yes	Yes
Standalone Curve Storage (Retired)	1.2.840.10008.5.1.4.1.1.9	Yes	Yes
12-lead ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.1	Yes	Yes
Hemodynamic Waveform Storage	1.2.840.10008.5.1.4.1.1.9.2.1	Yes	Yes
General ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.2	Yes	Yes
Grayscale Softcopy Presentation State Storage SOP Class	1.2.840.10008.5.1.4.1.1.11.1	Yes	Yes
X-Ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1	Yes	Yes
Enhanced XA Image Storage	1.2.840.10008.5.1.4.1.1.12.1.1	Yes	Yes
X-Ray Radiofluoroscopic Image Storage	1.2.840.10008.5.1.4.1.1.12.2	Yes	Yes
X-Ray Angiographic Bi-plane Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.12.3	Yes	Yes
X-Ray 3D Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.13.1.1	Yes	Yes
Breast Tomosynthesis Image Storage	1.2.840.10008.5.1.4.1.1.13.1.3	Yes	Yes
Intravascular Optical Coherence Tomography Image Storage – For Presentation	1.2.840.10008.5.1.4.1.1.14.1	Yes	Yes

SOP Class Name	SOP Class UID	SCU	SCP
Intravascular Optical Coherence Tomography Image Storage – For Processing	1.2.840.10008.5.1.4.1.1.14.2	Yes	Yes
Nuclear Medicine Image Storage	1.2.840.10008.5.1.4.1.1.20	Yes	Yes
Raw Data Storage	1.2.840.10008.5.1.4.1.1.66	Yes	Yes
Segmentation Storage	1.2.840.10008.5.1.4.1.1.66.4	Yes	Yes
Real World Value Mapping Storage	1.2.840.10008.5.1.4.1.1.67	Yes	Yes
Visible Light Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1	Yes	Yes
Video Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1.1	Yes	Yes
Visible Light Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.2	Yes	Yes
Visible Light Slide-Coordinates Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.3	Yes	Yes
Visible Light Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4	Yes	Yes
Basic Text SR	1.2.840.10008.5.1.4.1.1.88.11	Yes	Yes
Enhanced SR	1.2.840.10008.5.1.4.1.1.88.22	Yes	Yes
Comprehensive SR	1.2.840.10008.5.1.4.1.1.88.33	Yes	Yes
Procedure Log	1.2.840.10008.5.1.4.1.1.88.40	Yes	Yes
Mammography CAD SR	1.2.840.10008.5.1.4.1.1.88.50	Yes	Yes
Key Object Selection Document	1.2.840.10008.5.1.4.1.1.88.59	Yes	Yes
Chest CAD SR	1.2.840.10008.5.1.4.1.1.88.65	Yes	Yes
X-Ray Radiation Dose SR	1.2.840.10008.5.1.4.1.1.88.67	Yes	Yes
Encapsulated PDF Storage	1.2.840.10008.5.1.4.1.1.104.1	Yes	Yes
Positron Emission Tomography Image Storage	1.2.840.10008.5.1.4.1.1.128	Yes	Yes
Radiotherapy Image Storage	1.2.840.10008.5.1.4.1.1.481.1	Yes	Yes
Radiotherapy Dose Storage	1.2.840.10008.5.1.4.1.1.481.2	Yes	Yes
Radiotherapy Structure Set Storage	1.2.840.10008.5.1.4.1.1.481.3	Yes	Yes
Radiotherapy Beams Treatment Storage	1.2.840.10008.5.1.4.1.1.481.4	Yes	Yes
Radiotherapy Plan Storage	1.2.840.10008.5.1.4.1.1.481.5	Yes	Yes
Radiotherapy Brachy Treatment Record Storage	1.2.840.10008.5.1.4.1.1.481.6	Yes	Yes
Radiotherapy Treatment Summary Record Storage	1.2.840.10008.5.1.4.1.1.481.7	Yes	Yes
Patient Root Query/Retrieve Information Model – FIND	1.2.840.10008.5.1.4.1.2.1.1	No	Yes
Patient Root Query/Retrieve Information Model – MOVE	1.2.840.10008.5.1.4.1.2.1.2	No	Yes
Study Root Query/Retrieve Information Model – FIND	1.2.840.10008.5.1.4.1.2.2.1	No	Yes
Study Root Query/Retrieve Information Model – MOVE	1.2.840.10008.5.1.4.1.2.2.2	No	Yes
Patient/Study Only Query/Retrieve Information Model - FIND	1.2.840.10008.5.1.4.1.2.3.1	No	Yes

SOP Class Name	SOP Class UID	SCU	SCP
Patient/Study Only Query/Retrieve Information Model - MOVE	1.2.840.10008.5.1.4.1.2.3.2	No	Yes
General Purpose Worklist Management Meta SOP Class	1.2.840.10008.5.1.4.32	No	Yes
General Purpose Worklist Information Model – FIND SOP Class	1.2.840.10008.5.1.4.32.1	No	Yes
General Purpose Scheduled Procedure Step SOP Class	1.2.840.10008.5.1.4.32.2	No	Yes
General Purpose Performed Procedure Step	1.2.840.10008.5.1.4.32.3	Yes	Yes
Instance Availability Notification	1.2.840.10008.5.1.4.33	Yes	No
Phillips Live 3D 01 (Phillips HP Sonos 7500)	1.2.840.113543.6.6.1.3.10001	Yes	Yes
Phillips Live 3D 02 (Phillips HP Sonos 7500)	1.2.840.113543.6.6.1.3.10002	Yes	Yes
GE 3D Model Image (GE Advantage 3D XR)	1.2.840.113619.4.26	Yes	Yes
GE PET Advance Raw Data (GE AW Raw)	1.2.840.113619.4.30	Yes	Yes

Note: Centricity PACS supports storage, retrieval, and send of the X-Ray Radiation Dose SR SOP and all templates associated with it.

Note: Centricity PACS acts as a forwarder for the GP PPS SOP. See section 2.3.1.2.4 for more information.

Note: The DAS AE provides Standard Conformance to any of the storage DICOM SOP Classes listed in Table 2-1 as SCU for the C-STORE sub-operations initiated in a C-MOVE context.

2.3.1.1 Association Establishment Policies

This section describes the common behaviors of all services of the DAS AE with respect to the DICOM network association establishment. Specific behaviors of each individual service will be described in Sections 2.3.1.2 and 2.3.1.3.

2.3.1.1.1 General

The DICOM Application Context Name (ACN), which is always proposed by the DAS AE, is:

Name	UID
DICOM Application Context Name	1.2.840.10008.3.1.1.1

The Maximum Length of PDU negotiation is included in all association establishment requests. The Maximum Length of PDU proposed for all associations initiated by the DAS AE is configurable (see Section 2.7.7) up to:

Maximum Length of PDU	28,672 Bytes

The number given above (28,672 bytes) is also the Maximum Length of PDU in all DICOM associations that the DAS AE can accept.

The DAS AE does not support SOP class Extended Negotiation in any DICOM associations its services accept.

The Storage Services of the DAS AE will propose (SCU/SCP) Role Selection Negotiation in a DICOM association it initiates for sending the Storage Commitment Result, but will only accept SCP role.

Other services of the DAS AE will not propose (SCU/SCP) Role Selection Negotiation in any DICOM associations they initiate.

The user information items sent by the services of the DAS AE are:

- Maximum Length of PDU
- Implementation Class UID
- Implementation Version Name

2.3.1.1.2 Number of Associations

The DAS AE is able to initiate and accept multiple DICOM associations at a time to perform DIMSE service elements. The maximum number of simultaneous DICOM associations that can be initiated and accepted are configurable for the DAS AE, but not for separate AEs (see Section 2.7.2).

Table 2-2 shows how the relationship between the separate AEs and the maximum number of simultaneous DICOM associations that the DAS AE can support. The numbers in Table 2-2 are the default values.

TABLE 2-2
THE DEFAULT MAXIMUM NUMBER OF SIMULTANEOUS ASSOCIATIONS SUPPORTED BY THE SERVICES OF THE DAS AE

Association Purpose	Default Maximum Number of Associations	
	Initiation	Acceptance
Send SOP Instances, MPPS messages, GP-PPS messages, and IAN messages	2	—
Send Storage Commitment Result	1	—
Receive SOP Instances, MPPS messages and Storage Commitment Requests	—	See Note
Receive (Service) Query or Retrieve Requests	—	See Note
Sub-ops for sending SOP Instances (for Retrieve Requests)	See Note	—
Receive GP-SPS and GP-PPS Messages	—	See Note
Receive (Service) GPWL Query Request	—	See Note

Note: There can be a total of 25 outstanding associations for these areas combined.

As shown in Table 2-2**,** by default, the DAS AE is able to initiate totally two simultaneous associations for sending the SOP Instances. This includes execution of the Image Send commands issued by the Centricity PACS system or users. For the Storage Commitment Result, the DAS AE will always initiate one single association.

By default, the DAS AE is able to support a maximum 25 simultaneous associations for receiving SOP Instances and Storage Commitment Requests, as well as for servicing Query and Retrieve requests. This includes all additional associations required for sending SOP Instances as the store sub-operations resulting from servicing a DICOM Retrieve request. The DAS AE does not restrict the number of maximum simultaneous associations individually for the separate services and serves the incoming associations on a first-come-first-serve basis, until the configured maximum number is reached.

Note: Centricity PACS supports multiple instances of the DAS AE running simultaneously. If the number of simultaneous associations supported by a single DAS AE is not sufficient, multiple Centricity PACS DAS subsystems can be configured.

2.3.1.1.3 Asynchronous Nature

None of the DAS AE services support asynchronous operations. All operations will be performed synchronously.

2.3.1.1.4 Implementation Identifying Information

All services of the DAS AE provide the same Implementation Class UID, which is:

Implementation Class UID	1.2.840.113619.6.94

All services of the DAS AE provide the same Implementation Version Name, which is:

Implementation Version Name	CENTRICITY_3.0

2.3.1.1.5 Timers

2.3.1.1.5.1 Association Timers

The DAS AE supports an association timer for an association that the DAS AE plays the role of association initiator.

The association timer starts when the association request is sent, and stops when the association is established.

2.3.1.1.5.2 Operation Inactivity Timer

The DAS AE supports an operation inactivity timer in each association.

For the role of association initiator, the operation inactivity timer re-starts every time a DIMSE service request has been issued.

For the role of association acceptor, the operation inactivity timer re-starts every time a DIMSE service response has been sent.

2.3.1.2 Association Initiation Policies

All services of the DAS AE can be configured to initiate association establishment only to remote AEs defined in a Remote AE list for the initiation of DICOM associations. The Remote AEs are specified with the Remote AE Titles as well as the network presentation addresses in the remote AE lists configured for the DAS AE (see Section 2.7.1).

The calling AE Titles can be configured for each AE of the DAS AE.

2.3.1.2.1 Real-World Activity: Send SOP Instance(s) to Remote AE

This section describes the Conformance Statement for the data sending functions supported in Centricity PACS. They are implemented in the DAS AE as the SCU role of the DICOM Storage SOP Classes.

The DAS AE initiates a DICOM association for sending DICOM Storage SOP instances to a remote AE by performing the C-STORE operations.

The DAS AE is able to initiate multiple DICOM associations to remote AEs simultaneously. The maximum number of concurrent associations that the DAS AE can initiate for sending the SOP Instances, is configurable (see Section 2.7.2 and Table 2-2).

A list of remote AE can be configured, so that the DAS AEwill initiate associations only to these AEs for sending SOP Instances. This includes the C-STORE sub-operation association initiation within a C-MOVE association.

2.3.1.2.1.1 Associated Real-World Activities

The DAS AE will initiate a DICOM association for sending one or more SOP instances to a remote AE in response to the following real-world activities:

A user initiated a DICOM Send command for a specified study with a specified destination AE on the Centricity PACS RA1000 Workstation.

The Centricity PACS has been configured to send a study to a specified destination AE when the study's status changes to a specified value, and this condition occurs.

2.3.1.2.1.2 Proposed Presentation Contexts

Table 2-3 shows the Presentation Contexts proposed by the DAS AE after the real-world activity "Send DICOM Instance" (refer to Figure 2-4) has been performed.

TABLE 2-3
PROPOSED PRESENTATION CONTEXTS FOR DAS AE

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1	Table 2-4	Table 2-4	SCU	None
Digital X-Ray Image Storage (for presentation)	1.2.840.10008.5.1.4.1.1.1.1	Table 2-4	Table 2-4	SCU	None
Digital X-Ray Image Storage (for processing)	1.2.840.10008.5.1.4.1.1.1.1.1	Table 2-4	Table 2-4	SCU	None
Digital Mammography X-Ray Image Storage (for presentation)	1.2.840.10008.5.1.4.1.1.1.2	Table 2-4	Table 2-4	SCU	None
Digital Mammography X-Ray Image Storage (for processing)	1.2.840.10008.5.1.4.1.1.1.2.1	Table 2-4	Table 2-4	SCU	None
Digital Intra-oral X-Ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.1.3	Table 2-4	Table 2-4	SCU	None
Digital Intra-oral X-Ray Image Storage - For Processing	1.2.840.10008.5.1.4.1.1.1.3.1	Table 2-4	Table 2-4	SCU	None
Computed Tomography Image Storage	1.2.840.10008.5.1.4.1.1.2	Table 2-4	Table 2-4	SCU	None
Enhanced CT Image Storage	1.2.840.10008.5.1.4.1.1.2.1	Table 2-4	Table 2-4	SCU	None
Ultrasound Multi-Frame Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.3	Table 2-4	Table 2-4	SCU	None
Ultrasound Multi-Frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1	Table 2-4	Table 2-4	SCU	None
Magnetic Resonance Image Storage	1.2.840.10008.5.1.4.1.1.4	Table 2-4	Table 2-4	SCU	None
Enhanced MR Image Storage	1.2.840.10008.5.1.4.1.1.4.1	Table 2-4	Table 2-4	SCU	None
MR Spectroscopy Storage	1.2.840.10008.5.1.4.1.1.4.2	Table 2-4	Table 2-4	SCU	None
Nuclear Medicine Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.5	Table 2-4	Table 2-4	SCU	None
Ultrasound Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.6	Table 2-4	Table 2-4	SCU	None
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1	Table 2-4	Table 2-4	SCU	None
Enhanced US Volume Storage	1.2.840.10008.5.1.4.1.1.6.2	Table 2-4	Table 2-4	SCU	None

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	Table 2-4	Table 2-4	SCU	None
Multi-frame Grayscale Byte Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.2	Table 2-4	Table 2-4	SCU	None
Multi-Frame Grayscale Word Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.3	Table 2-4	Table 2-4	SCU	None
Multi-frame True Color Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.4	Table 2-4	Table 2-4	SCU	None
Standalone Curve Storage (Retired)	1.2.840.10008.5.1.4.1.1.9	Table 2-4	Table 2-4	SCU	None
12-lead ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.1	Table 2-4	Table 2-4	SCU	None
General ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.2	Table 2-4	Table 2-4	SCU	None
Hemodynamic Waveform Storage	1.2.840.10008.5.1.4.1.1.9.2.1	Table 2-4	Table 2-4	SCU	None
Grayscale Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.1	Table 2-4	Table 2-4	SCU	None
X-Ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1	Table 2-4	Table 2-4	SCU	None
Enhanced XA Image Storage	1.2.840.10008.5.1.4.1.1.12.1.1	Table 2-4	Table 2-4	SCU	None
X-Ray Radiofluoroscopic Image Storage	1.2.840.10008.5.1.4.1.1.12.2	Table 2-4	Table 2-4	SCU	None
X-Ray Angiographic Bi-plane Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.12.3	Table 2-4	Table 2-4	SCU	None
X-Ray 3D Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.13.1.1	Table 2-4	Table 2-4	SCU	None
Breast Tomosynthesis Image Storage	1.2.840.10008.5.1.4.1.1.13.1.3	Table 2-4	Table 2-4	SCU	None
Intravascular Optical Coherence Tomography Image Storage – For Presentation	1.2.840.10008.5.1.4.1.1.14.1	Table 2-4	Table 2-4	SCU	None
Intravascular Optical Coherence Tomography Image Storage – For Processing	1.2.840.10008.5.1.4.1.1.14.2	Table 2-4	Table 2-4	SCU	None
Nuclear Medicine Image Storage	1.2.840.10008.5.1.4.1.1.20	Table 2-4	Table 2-4	SCU	None
Raw Data Storage	1.2.840.10008.5.1.4.1.1.66	Table 2-4	Table 2-4	SCU	None

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
Segmentation Storage	1.2.840.10008.5.1.4.1.1.66.4	Table 2-4	Table 2-4	SCU	None
Real World Value Mapping Storage	1.2.840.10008.5.1.4.1.1.67	Table 2-4	Table 2-4	SCU	None
Visible Light Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1	Table 2-4	Table 2-4	SCU	None
Video Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1.1	Table 2-4	Table 2-4	SCU	None
Visible Light Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.2	Table 2-4	Table 2-4	SCU	None
Visible Light Slide-Coordinates Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.3	Table 2-4	Table 2-4	SCU	None
Visible Light Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4	Table 2-4	Table 2-4	SCU	None
Basic Text SR	1.2.840.10008.5.1.4.1.1.88.11	Table 2-4	Table 2-4	SCU	None
Enhanced SR	1.2.840.10008.5.1.4.1.1.88.22	Table 2-4	Table 2-4	SCU	None
Comprehensive SR	1.2.840.10008.5.1.4.1.1.88.33	Table 2-4	Table 2-4	SCU	None
Procedure Log	1.2.840.10008.5.1.4.1.1.88.40	Table 2-4	Table 2-4	SCU	None
Mammography CAD SR	1.2.840.10008.5.1.4.1.1.88.50	Table 2-4	Table 2-4	SCU	None
Key Object Selection Document	1.2.840.10008.5.1.4.1.1.88.59	Table 2-4	Table 2-4	SCU	None
Chest CAD SR	1.2.840.10008.5.1.4.1.1.88.65	Table 2-4	Table 2-4	SCU	None
X-Ray Radiation Dose SR	1.2.840.10008.5.1.4.1.1.88.67	Table 2-4	Table 2-4	SCU	None
Encapsulated PDF Storage	1.2.840.10008.5.1.4.1.1.104.1	Table 2-4	Table 2-4	SCU	None
Positron Emission Tomography Image Storage	1.2.840.10008.5.1.4.1.1.128	Table 2-4	Table 2-4	SCU	None
Radiotherapy Image Storage	1.2.840.10008.5.1.4.1.1.481.1	Table 2-4	Table 2-4	SCU	None
Radiotherapy Dose Storage	1.2.840.10008.5.1.4.1.1.481.2	Table 2-4	Table 2-4	SCU	None

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
Radiotherapy Structure Set Storage	1.2.840.10008.5.1.4.1.1.481.3	Table 2-4	Table 2-4	SCU	None
Radiotherapy Beams Treatment Storage	1.2.840.10008.5.1.4.1.1.481.4	Table 2-4	Table 2-4	SCU	None
Radiotherapy Plan Storage	1.2.840.10008.5.1.4.1.1.481.5	Table 2-4	Table 2-4	SCU	None
Radiotherapy Brachy Treatment Record Storage	1.2.840.10008.5.1.4.1.1.481.6	Table 2-4	Table 2-4	SCU	None
Radiotherapy Treatment Summary Record Storage	1.2.840.10008.5.1.4.1.1.481.7	Table 2-4	Table 2-4	SCU	None
Phillips Live 3D 01 (Phillips HP Sonos 7500)	1.2.840.113543.6.6.1.3.10001	Table 2-4	Table 2-4	SCU	None
Phillips Live 3D 02 (Phillips HP Sonos 7500)	1.2.840.113543.6.6.1.3.10002	Table 2-4	Table 2-4	SCU	None
GE 3D Model Image (GE Advantage 3D XR)	1.2.840.113619.4.26	Table 2-4	Table 2-4	SCU	None
GE PET Advance Raw Data (GE AW Raw)	1.2.840.113619.4.30	Table 2-4	Table 2-4	SCU	None

In order to send a SOP Instance, the DAS AE requires that the transfer syntax of the SOP Instance match one of the transfer syntaxes that the SCP selected for the accepted Presentation Context. If no transfer syntaxes match, the DAS AE will be not able to send the SOP Instance.

TABLE 2-4
SUPPORTED TRANSFER SYNTAXES FOR SEND INSTANCES

Name	UID
Implicit VR Little Endian	1.2.840.10008.1.2
Explicit VR Little Endian	1.2.840.10008.1.2.1
Explicit VR Big Endian	1.2.840.10008.1.2.2
JPEG Baseline, Lossy JPEG 8-Bit Image Compression	1.2.840.10008.1.2.4.50
MPEG2 Main Profile @ Main Level	1.2.840.10008.1.2.4.100

Note: By default, the DAS AE proposes the transfer syntax of the stored Instance and the standard default transfer syntaxes. Only the transfer syntax combinations needed for IOD transfer will be utilized. Not all combinations will be used.

2.3.1.2.1.2.1 SOP Specific Conformance Statement for All Storage SOP Classes

The DAS AE provides standard conformance to the DICOM Standard Storage Service Class as SCU for all storage SOP classes listed in Table 2-3.

The DAS AE will invoke DIMSE C-STORE service element to perform the SOP Instance Send operation.

All optional elements, which exist in the Storage SOP Instance, will be sent. The existence of optional elements depends on the equipment sending images to Centricity PACS.

All private elements, which exist in the Storage SOP Instance, will be sent. The existence of private elements depends on the equipment sending images to Centricity PACS.

Non-DICOM images stored on Centricity PACS will be converted to a DICOM Secondary Capture SOP Class, and transmitted by performing the C-STORE operation.

The DAS AE does not use the C-STORE priority attribute.

Note: As pointed out previously, SOP Instances sent to the remote AE may have undergone correction / modification in certain data elements. A list of the data elements that may undergo data coercion is given in Section 2.3.1.4.2.

The implementation of the DAS AE can perform multiple C-STORE operations over one single association. The DAS AE will propose all Presentation Contexts as the list of SOP Instances to be sent dictates, and send all SOP Instances as long as the required Presentation Contexts are accepted.

Upon receiving a C-STORE-RSP containing a "Success" or "Warning" status, the DAS AE will perform the next C-STORE operation. The association will be maintained if possible.

Upon receiving a C-STORE-RSP containing a "Refused" status, the DAS AE will terminate the association. The remaining SOP Instances are not transmitted.

Upon receiving a C-STORE-RSP which contains an "Error" status, the DAS AE will consider the current request to be failed, but will continue to attempt to send the remaining SOP Instances on the same association.

If any of the timers (see Section 2.3.1.1.5) expires, the connection is closed and the operation in progress is considered failed.

In any case, the SOP Instances sent are always retained in Centricity PACS.

2.3.1.2.1.3 Extended Character Sets

The DAS AE may perform a data coercion in a SOP Instance sent out, in order to update the data set with the information maintained in the Centricity PACS database. The Patient's Name (0010,0010) may be multi-valued to include Ideographic and Phonetic name groups in addition to Alphabetic Name. This will be done if the receiving AE has been configured to intend to receive these additional names and these are available in Centricity PACS database. While the Alphabetic Name is always encoded with the ISO-IR-100 character set, the Ideographic and

Phonetic Names can be encoded with other dual-byte character sets as listed in Section 2.8. In the current release, the DAS AE will not add text information encoded with extended character sets into other data elements.

See Centricity PACS service documentation for the peer AE configuration method.

2.3.1.2.2 Real-World Activity: Send Storage Commitment Result to Remote AE

The DAS AE initiates a DICOM association to send a DICOM Storage Commitment Result notification to a remote AE, in response to a previously received Storage Commitment Request.

The DAS AE will always initiate a new DICOM association to send the Storage Commitment Result. It will never send a Storage Commitment Result in the same DICOM association in which a DICOM Storage Commitment Request was received.

The DAS AE will always initiate one single DICOM association for sending the Storage Commitment Result simultaneously. Multiple Storage Commitment Results will be sent subsequently.

2.3.1.2.2.1 Associated Real-World Activity

The following real-world activity will cause the DAS AE to initiate a DICOM association for sending a DICOM Storage Commitment Result (refer to Figure 2-2):

- The DAS AE periodically polls the Centricity PACS Storage Commitment Queue and gets a job, which is pending, completed, or timed-out.

2.3.1.2.2.2 Proposed Presentation Contexts

The DAS AE will propose the Presentation Context listed in Table 2-5 for sending a Storage Commitment Result to a remote AE.

TABLE 2-5
PROPOSED PRESENTATION CONTEXTS FOR DAS AE STORAGE COMMITMENT RESULT

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Storage Commitment Push Model	1.2.840.10008.1.20.1	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	SCU/SCP Role Selection
Storage Commitment Push Model	1.2.840.10008.1.20.1	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	SCU/SCP Role Selection
Storage Commitment Push Model	1.2.840.10008.1.20.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	SCU/SCP Role Selection

The column "Transfer Syntax" in Table 2-5 list all transfer syntaxes that the DAS AE can propose for the Abstract Syntax Storage Commitment Push Model SOP Class. The DAS AE can be configured to propose the Presentation Contexts with one or several or all of these transfer syntaxes.

The DAS AE will propose SCU/SCP Role Selection negotiation for the Presentation Contexts of the Storage Commitment Push Model SOP Class.

2.3.1.2.2.1 SOP Specific Conformance Statement for Storage Commitment Push Model SOP Class

The DAS AE will invoke the N-EVENT-REPORT operation in a newly created association to send the Storage Commitment Result to the remote AE in response to a previously received Storage Commitment Request.

The DAS AE can send one or more Storage Commitment Results over a single association.

The DAS AE always initiates a separate, dedicated association to send Storage Commitment Results. It will never send Storage Commitment Results over the same association that a Storage Commitment Request was received on.

The DAS AE does not support the optional Storage Media File-Set ID and Storage Media File-Set UID in the Storage Commitment Result. The DAS AE does not support the optional Retrieve AE Title Attribute in the Storage Commitment Result.

The DAS AE only supports the Failure Reasons listed in Table 2-6 and will return one of these reasons in the Failure Storage Commitment Result.

TABLE 2-6
FAILURE CODES SUPPORTED BY THE DAS AE

Failure Code	Failure Reason	Description
0110H	Processing Failure	Requested SOP Instances are failed for archiving or the PACS installation site is designated not to archive data permanently.
0112H	No such object instance	Requested SOP Instances cannot be found in the Centricity PACS database (still not yet received when the job timer expired).
0213H	Resource limitation	Requested SOP Instances cannot be archived due to a temporary resource limitation.

Refer to section 8 for more information on the Storage Commitment Push Model implementation.

2.3.1.2.3 Real-World Activity: Send MPPS messages to Remote AE

The DAS AE will perform N-CREATE-RQ and N-SET-RQ operations to support this real-world activity.

A list of remote AEs can be configured, so that the DAS AE will initiate associations only to those AEs that are to receive MPPS messages. This configuration capability allows the user control of the valid DICOM destinations.

The DAS AE initiates a DICOM association to send (i.e. forward) MPPS messages to a remote AE.

The DAS AE provides a guaranteed, reliable service for forwarding the received MPPS messages. Every received MPPS message will be forwarded to a remote AE(s). All received MPPS messages are forwarded with complete message fidelity/integrity.

If a modality is not equipped to function as an MPPS SCU, the DAS AE can be configured to generate MPPS messages based upon workflow completion within Centricity PACS and subsequent queuing to the MPPS message routing queue.

The DAS AE may initiate a single DICOM association for sending a MPPS message to multiple destinations.

Since the DAS AE does not support the reception of the following DICOM SOP Classes relating to the MPPS management functionality:

- Modality Performed Procedure Step Retrieve SOP Class
- Modality Performed Procedure Step Notification SOP Class

and since the Centricity PACS is simply a forwarder of MPPS messages, the DAS AE does not support the sending of MPPS messages involving these two MPPS SOP Classes.

2.3.1.2.3.1 Associated Real-World Activity

The following real-world activity will cause the DAS AE to initiate a DICOM association for sending MPPS messages (refer to Figure 2-5):

- There is a pending MPPS forwarding job in the Centricity PACS MPPS Message Routing Queue.

2.3.1.2.3.2 Proposed Presentation Context

The DAS AE will propose the following Presentation Context in order to send MPPS N-CREATE and N-SET requests to a remote AE.

TABLE 2-7
PROPOSED PRESENTATION CONTEXT FOR MPPS SCU

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Modality Performed Procedure Step SOP Class	1.2.840.10008.3.1.2.3.3	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None
Modality Performed Procedure Step SOP Class	1.2.840.10008.3.1.2.3.3	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
Modality Performed Procedure Step SOP Class	1.2.840.10008.3.1.2.3.3	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

The Transfer Syntax column in Table 2-7 list all transfer syntaxes that the DAS AE can propose for the Abstract Syntax “Modality Performed Procedure Step SOP Class”. The DAS AE can be configured to propose the Presentation Contexts with one or several or all of these transfer syntaxes.

2.3.1.2.3.2.1 SOP Specific Conformance Statement for Modality Performed Procedure Step SOP Class

The Centricity PACS does not, of itself, initiate the creation of a MPPS objects. It receives N-CREATE-RQ messages from the originating MPPS SCU (i.e. modality), creates an MPPS object, and forwards this N-CREATE-RQ message on to remote AEs. Similarly, the Centricity PACS does not, of itself, change the status of existing MPPS objects. It receives N-SET-RQ messages from the originating MPPS SCU (i.e. modality), updates the MPPS object, and forwards this N-SET-RQ message on to remote AEs.

The DAS AE will periodically poll the MPPS Message Routing Queue, if one or more MPPS forwarding destinations have been configured in the system.

If MPPS forwarding is enabled by configuration, the DAS AE will send the queued MPPS DIMSE N-CREATE-RQ or N-SET-RQ messages to the specified forwarding destination(s) in one or more associations negotiated with the Presentation Contexts shown in Table 2-7.

2.3.1.2.3.2.1.1 Sending DIMSE N-CREATE-RQ Messages

The DAS AE will send a DIMSE N-CREATE-RQ message that may include all the attributes listed in Section 6. The list of attributes included in the N-CREATE-RQ message depends upon the list of attributes that were sent by the originating MPPS SCU (i.e. modality). The Centricity PACS does not add any attributes.

In all DIMSE N-CREATE-RQ messages sent by the DAS AE, the Affected SOP Instance UID will be always filled in with a valid value, which is the same one used by the Centricity PACS system to create the MPPS object.

2.3.1.2.3.2.1.2 Sending DIMSE N-SET-RQ Messages

The DAS AE will send a DIMSE N-SET-RQ message that may include all attributes listed in Section 6. The list of attributes included in the N-SET-RQ message depends upon the list of attributes that were sent by the originating MPPS SCU (i.e. modality). The Centricity PACS does not add any attributes.

2.3.1.2.3.2.1.3 Receiving DIMSE N-CREATE-RSP Messages

The DAS AE is able to process all standard status codes in the DIMSE N-CREATE-RSP message received from the peer application, in response to the MPPS request (i.e. N-CREATE-RQ) message.

2.3.1.2.3.2.1.4 Receiving DIMSE N-SET-RSP Messages

The DAS AE is able to process all standard status codes in the DIMSE N-SET-RSP messages received from the peer application, in response to the MPPS request (i.e. N-SET-RQ) message.

2.3.1.2.4 Real-World Activity: Send GP-PPS messages to Remote AE

The DAS AE initiates a DICOM association to send (i.e. forward) GP-PPS messages to a remote AE.

The DAS AE provides a guaranteed, reliable service for forwarding the received GP-PPS messages. Every received GP-PPS message will be forwarded to a remote AE(s). All received GP-PPS messages are forwarded with complete message fidelity/integrity.

The DAS AE may initiate a single DICOM association for sending a GP-PPS message to multiple destinations.

2.3.1.2.4.1 Associated Real-World Activity

The following real-world activity will cause the DAS AE to initiate a DICOM association for sending GP-PPS messages (refer to Figure 2-6):

- There is a pending GP-PPS forwarding job in the Centricity PACS MPPS Message Routing Queue.

2.3.1.2.4.2 Proposed Presentation Context

The DAS AE will propose the following Presentation Context in order to send GP-PPS N-CREATE and N-SET requests to a remote AE.

TABLE 2-8
PROPOSED PRESENTATION CONTEXT FOR GP-PPS SCU

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
General Purpose Performed Procedure Step SOP Class	1.2.840.10008.5.1.4.32.3	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None
General Purpose Performed Procedure Step SOP Class	1.2.840.10008.5.1.4.32.3	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
General Purpose Performed Procedure Step SOP Class	1.2.840.10008.5.1.4.32.3	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

The Transfer Syntax column in Table 2-8 list all transfer syntaxes that the DAS AE can propose for the Abstract Syntax "General Purpose Performed Procedure Step SOP Class". The DAS AE can be configured to propose the Presentation Contexts with one or several or all of these transfer syntaxes.

2.3.1.2.4.2.1 SOP Specific Conformance Statement for General Purpose Performed Procedure Step SOP Class

The Centricity PACS receives N-CREATE-RQ messages from the originating GP-PPS SCU (i.e. 3rd Party Workstation), creates an GP-PPS object, and forwards this N-CREATE-RQ message on to remote AEs. Similarly, the Centricity PACS does not, of itself, change the status of existing GP-PPS objects. It receives N-SET-RQ messages from the originating GP-PPS SCU (i.e. 3rd Party Workstation), updates the GP-PPS object, and forwards this N-SET-RQ message on to remote AEs.

The DAS AE will periodically poll the MPPS Message Routing Queue, if one or more GP-PPS forwarding destinations have been configured in the system.

If GP-PPS forwarding is enabled by configuration, the DAS AE will send the queued GP-PPS DIMSE N-CREATE-RQ or N-SET-RQ messages to the specified forwarding destination(s) in one or more associations negotiated with the Presentation Contexts shown in Table 2-8.

2.3.1.2.4.2.1.1 Sending DIMSE N-CREATE-RQ Messages

The DAS AE will send a DIMSE N-CREATE-RQ message that may include all the attributes listed in Table 11-3. The list of attributes included in the N-CREATE-RQ message depends upon the list of attributes that were sent by the originating GP-PPS SCU (i.e. 3rd Party Workstation). The Centricity PACS does not add any attributes.

In all DIMSE N-CREATE-RQ messages sent by the DAS AE, the Affected SOP Instance UID will be always filled in with a valid value by the Centricity PACS system.

2.3.1.2.4.2.1.2 Sending DIMSE N-SET-RQ Messages

The DAS AE will send a DIMSE N-SET-RQ message that may include all attributes listed in Section 11. The list of attributes included in the N-SET-RQ message depends upon the list of attributes that were sent by the originating GP-PPS SCU (i.e. 3rd Party Workstation). The Centricity PACS does not add any attributes.

2.3.1.2.4.2.1.3 Receiving DIMSE N-CREATE-RSP Messages

The DAS AE is able to process all standard status codes in the DIMSE N-CREATE-RSP message received from the peer application, in response to the GP-PPS request (i.e. N-CREATE-RQ) message.

2.3.1.2.4.2.1.4 Receiving DIMSE N-SET-RSP Messages

The DAS AE is able to process all standard status codes in the DIMSE N-SET-RSP messages received from the peer application, in response to the GP-PPS request (i.e. N-SET-RQ) message.

2.3.1.2.4.3 Extended Character Sets

Only the following character sets are supported by the DAS AE for the DICOM General Purpose Worklist Meta SOP Class:

- ISO-IR-100 (ISO 8859-1)

No other extended character sets are supported.

2.3.1.2.5 Real-World Activity: Send IAN messages to Remote AE

The DAS AE initiates a DICOM association to send an IAN message(s) to a remote AE. The DAS AE initiates a DICOM association for each destination.

The DAS AE provides a guaranteed, reliable service for sending an IAN message(s) to a remote AE. The remote AE must acknowledge the acceptance of the IAN message.

2.3.1.2.5.1 Associated Real-World Activity

The following real-world activities will cause the DAS AE to initiate a DICOM association for sending IAN messages (refer to Figure 2-7):

- The Centricity PACS receives an MPPS message having a value for the attribute "Performed Procedure Step Status" (0040,0252) of "COMPLETED", and all images referenced by the MPPS have been received by the PACS.
- An exam is Query/Retrieved into PACS.
- An exam is retrieved from long-term storage into short-term storage.
- An exam is verified in PACS.
- An exam is received into PACS as the result of a Centricity PACS-to-Centricity PACS (C2C) transfer.
- An exam is flushed off of the PACS' short-term storage device(s).

2.3.1.2.5.2 Proposed Presentation Context

The DAS AE will propose the following Presentation Context in order to send an IAN N-CREATE request to a remote AE.

TABLE 2-9
PROPOSED PRESENTATION CONTEXT FOR INSTANCE AVAILABILITY NOTIFICATION SCU

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Instance Availability Notification SOP Class	1.2.840.10008.5.1.4.33	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None
Instance Availability Notification SOP Class	1.2.840.10008.5.1.4.33	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
Instance Availability Notification SOP Class	1.2.840.10008.5.1.4.33	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

The Transfer Syntax column in Table 2-9 list all transfer syntaxes that the DAS AE can propose for the Abstract Syntax "Instance Availability Notification SOP Class". The DAS AE can be configured to propose the Presentation Contexts with one or several or all of these transfer syntaxes.

2.3.1.2.5.2.1 SOP Specific Conformance Statement for Instance Availability Notification SOP Class

The Centricity PACS receives DIMSE N-CREATE-RQ and N-SET-RQ messages from an originating MPPS SCU (i.e. modality). If IAN message creation has been enabled by configuration at the PACS, once an MPPS N-SET-RQ message with a status of "COMPLETED" is received and all associated images have been successfully received and stored into the PACS, the DAS AE will generate an IAN N-CREATE-RQ message, and place it into a queue.

If a modality is not equipped to function as an MPPS SCU, Centricity PACS can be configured to generate MPPS messages. If IAN message creation is also enabled by configuration at the PACS, once all images associated with a study have been successfully received and stored into the PACS, the DAS AE will generate an MPPS N-CREATE-RQ message and an IAN N-CREATE-RQ message, and place them into message queues.

The DAS AE will periodically poll the IAN Message Routing Queue, if one or more IAN forwarding destinations have been configured in the system. The DAS AE will send the queued IAN N-CREATE-RQ message to the specified forwarding destination(s) in one or more associations negotiated with the Presentation Contexts shown in Table 2-9.

The DAS AE is able to process all standard status codes as defined in PS 3.7 Annex C in the DIMSE N-CREATE-RSP message received from the peer application, in response to the IAN request (i.e. N-CREATE-RQ) message.

Refer to Section 7 for details of the Instance Availability Notification implementation.

2.3.1.3 Association Acceptance Policies

Each AE of the DAS AE accepts incoming association requests on their dedicated TCP port numbers as defined in the configuration file (see Section 2.7.1). They will accept an association, if at least one proposed Presentation Context is acceptable.

The DAS AE can be configured to accept one or more particular transfer syntaxes for the same Abstract Syntax, if a remote AE offers multiple Presentation Contexts per association. The default value is that the DAS AE will only accept one transfer syntax for a particular Abstract Syntax.

All services of the DAS AE can be configured to accept association requests only from specific remote AEs defined in a Remote AE list (see Section 2.7.1). The remote AEs are specified with the AE Titles as well as with the network presentation addresses in the Remote AE list, configured for the DAS AE (see Section 2.7.1). This behavior of the DAS AE helps the user to control the remote AE's access for data archiving, Storage Commitment and Query/Retrieve services of Centricity PACS.

The called AE Titles can be configured for each AE of the DAS AE.

The DAS AE will check both the calling and called AE Titles for the acceptance of an incoming association.

Association requests can be rejected with the following status codes and reasons:

TABLE 2-10
ASSOCIATION REJECT STATUS CODES AND REASONS

Result	Source	Reason	Description
Rejected (transient)	UL service-provider	Temporary congestion	Resource limitation: process creation failed, memory allocation failed, etc.
Rejected (transient)	UL service-provider	Centricity PACS internal service down	Database network connection down, image storage network connection down, etc.
Rejected (permanent)	UL service-user	Application Context Name not supported	Incorrect (unknown) Application Context Name
Rejected (permanent)	UL service-user	Calling AE Title unknown or not supported	The calling AE Title is not included in the configuration list, or the calling AE is not supported by the called AE Title.
Rejected (permanent)	UL service-user	Called AE Title unknown or not supported	The called AE Title is unknown to the DAS AE, or the called AE is not supported by the calling AE Title.

2.3.1.3.1 Real-World Activity: Receive DICOM Verification (Echo) Request from Remote AE

The DAS AE supports the C-ECHO operation for this service.

2.3.1.3.1.1 Associated Real-World Activities

There is associated no real-world activity required for the DAS AE to respond to incoming DICOM associations. The DAS AE is always waiting for an incoming association and will automatically respond to a DICOM Verification request.

2.3.1.3.1.2 Acceptable Presentation Contexts

TABLE 2-11
ACCEPTABLE PRESENTATION CONTEXTS FOR DAS AE - VERIFICATION

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Verification (Echo)	1.2.840.10008.1.1	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None
Verification (Echo)	1.2.840.10008.1.1	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
Verification (Echo)	1.2.840.10008.1.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None

2.3.1.3.1.3 Presentation Context Acceptance Criteria

The DAS AE evaluates each Presentation Context independently, and accepts any Presentation Context that matches an Abstract Syntax for any Real-World Activity.

2.3.1.3.1.4 Transfer Syntax Selection Policies

The "Transfer Syntax" columns in Table 2-11 list all transfer syntaxes that the DAS AE can accept for the DICOM Presentation Contexts proposed for the specified Abstract Syntaxes.

The SOP classes listed in Table 2-11 can use any of different Transfer Syntaxes (i.e. Explicit VR Big Endian, Explicit VR Little Endian or Implicit VR Little Endian).

The DAS AE can be configured to accept one or several or all of these transfer syntaxes, for each Abstract Syntax, according to the transfer syntax selection rules specified in Section 2.3.1.3.

If several transfer syntaxes are present in a Presentation Context, the DAS AE will select a transfer syntax in the order as listed in Table 2-11.

2.3.1.3.2 Real-World Activity: Receive DICOM SOP Instances from Remote AE

This section describes the Conformance Statement for the data receiving functions supported in Centricity PACS. They are implemented in the DAS AE as the SCP role of the DICOM Storage SOP Classes.

The DAS AE constantly listens for incoming associations to receive DICOM Storage SOP instances from a remote AE.

The DAS AE is able to service multiple DICOM associations simultaneously. The maximum number of concurrent associations that the DAS AE can accept for receiving the SOP Instances, is configurable (see Section 2.7.2 and Table 2-2).

2.3.1.3.2.1 Associated Real-World Activities

The following real-world activities are associated with the Receive Storage SOP Instance operation (refer to Figure 2-2):

A physician orders a study for the patient at RIS. At the time the study is ordered, the RIS sends the study order and patient information to Centricity PACS, which subsequently creates an ordered study and expects to receive SOP Instances associated with this study.

The patient arrives in the Radiology department for the study. Either the modality is able to query the Modality Worklist from the Centricity Clinical Gateway or from a RIS or some other system, or a technologist manually enters the patient / study information into the modality. The technologist then performs the study on the patient.

Based on the patient / study information, the modality generates the DICOM Storage SOP instances as the results of the study and sends these to the DAS AE of Centricity PACS.

The DAS AE matches the DICOM objects received from the modality to an ordered study in the database. This is referred to as Study Profiling, see Section 2.3.1.4.1.

2.3.1.3.2.2 Accepted Presentation Context Table

Table 2-12 shows the Presentation Contexts acceptable for the DAS AE for receiving DICOM SOP Instances.

TABLE 2-12
ACCEPTABLE PRESENTATION CONTEXTS FOR DAS AE

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1	Table 2-13	Table 2-13	SCP	None
Digital X-Ray Image Storage (for presentation)	1.2.840.10008.5.1.4.1.1.1.1	Table 2-13	Table 2-13	SCP	None
Digital X-Ray Image Storage (for processing)	1.2.840.10008.5.1.4.1.1.1.1.1	Table 2-13	Table 2-13	SCP	None
Digital Mammography X-Ray Image Storage (for presentation)	1.2.840.10008.5.1.4.1.1.1.2	Table 2-13	Table 2-13	SCP	None
Digital Mammography X-Ray Image Storage (for processing)	1.2.840.10008.5.1.4.1.1.1.2.1	Table 2-13	Table 2-13	SCP	None
Digital Intra-oral X-Ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.1.3	Table 2-13	Table 2-13	SCP	None
Digital Intra-oral X-Ray Image Storage - For Processing	1.2.840.10008.5.1.4.1.1.1.3.1	Table 2-13	Table 2-13	SCP	None
Computed Tomography Image Storage	1.2.840.10008.5.1.4.1.1.2	Table 2-13	Table 2-13	SCP	None
Enhanced CT Image Storage	1.2.840.10008.5.1.4.1.1.2.1	Table 2-13	Table 2-13	SCP	None

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
Ultrasound Multi-Frame Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.3	Table 2-13	Table 2-13	SCP	None
Ultrasound Multi-Frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1	Table 2-13	Table 2-13	SCP	None
Magnetic Resonance Image Storage	1.2.840.10008.5.1.4.1.1.4	Table 2-13	Table 2-13	SCP	None
Enhanced MR Image Storage	1.2.840.10008.5.1.4.1.1.4.1	Table 2-13	Table 2-13	SCP	None
MR Spectroscopy Storage	1.2.840.10008.5.1.4.1.1.4.2	Table 2-13	Table 2-13	SCP	None
Nuclear Medicine Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.5	Table 2-13	Table 2-13	SCP	None
Ultrasound Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.6	Table 2-13	Table 2-13	SCP	None
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1	Table 2-13	Table 2-13	SCP	None
Enhanced US Volume Storage	1.2.840.10008.5.1.4.1.1.6.2	Table 2-13	Table 2-13	SCP	None
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	Table 2-13	Table 2-13	SCP	None
Multi-frame Grayscale Byte Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.2	Table 2-13	Table 2-13	SCP	None
Multi-Frame Grayscale Word Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.3	Table 2-13	Table 2-13	SCP	None
Multi-frame True Color Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.4	Table 2-13	Table 2-13	SCP	None
Standalone Curve Storage (Retired)	1.2.840.10008.5.1.4.1.1.9	Table 2-13	Table 2-13	SCP	None
12-lead ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.1	Table 2-13	Table 2-13	SCP	None
General ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.2	Table 2-13	Table 2-13	SCP	None
Hemodynamic Waveform Storage	1.2.840.10008.5.1.4.1.1.9.2.1	Table 2-13	Table 2-13	SCP	None
Grayscale Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.1	Table 2-13	Table 2-13	SCP	None

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
X-Ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1	Table 2-13	Table 2-13	SCP	None
Enhanced XA Image Storage	1.2.840.10008.5.1.4.1.1.12.1.1	Table 2-13	Table 2-13	SCP	None
X-Ray Radiofluoroscopic Image Storage	1.2.840.10008.5.1.4.1.1.12.2	Table 2-13	Table 2-13	SCP	None
X-Ray Angiographic Bi-plane Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.12.3	Table 2-13	Table 2-13	SCP	None
X-Ray 3D Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.13.1.1	Table 2-13	Table 2-13	SCP	None
Breast Tomosynthesis Image Storage	1.2.840.10008.5.1.4.1.1.13.1.3	Table 2-13	Table 2-13	SCP	None
Intravascular Optical Coherence Tomography Image Storage – For Presentation	1.2.840.10008.5.1.4.1.1.14.1	Table 2-13	Table 2-13	SCP	None
Intravascular Optical Coherence Tomography Image Storage – For Processing	1.2.840.10008.5.1.4.1.1.14.2	Table 2-13	Table 2-13	SCP	None
Nuclear Medicine Image Storage	1.2.840.10008.5.1.4.1.1.20	Table 2-13	Table 2-13	SCP	None
Raw Data Storage	1.2.840.10008.5.1.4.1.1.66	Table 2-13	Table 2-13	SCP	None
Segmentation Storage	1.2.840.10008.5.1.4.1.1.66.4	Table 2-13	Table 2-13	SCP	None
Real World Value Mapping Storage	1.2.840.10008.5.1.4.1.1.67	Table 2-13	Table 2-13	SCP	None
Visible Light Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1	Table 2-13	Table 2-13	SCP	None
Video Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1.1	Table 2-13	Table 2-13	SCP	None
Visible Light Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.2	Table 2-13	Table 2-13	SCP	None
Visible Light Slide-Coordinates Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.3	Table 2-13	Table 2-13	SCP	None
Visible Light Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4	Table 2-13	Table 2-13	SCP	None
Basic Text SR	1.2.840.10008.5.1.4.1.1.88.11	Table 2-13	Table 2-13	SCP	None

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
Enhanced SR	1.2.840.10008.5.1.4.1.1.88.22	Table 2-13	Table 2-13	SCP	None
Comprehensive SR	1.2.840.10008.5.1.4.1.1.88.33	Table 2-13	Table 2-13	SCP	None
Procedure Log	1.2.840.10008.5.1.4.1.1.88.40	Table 2-13	Table 2-13	SCP	None
Mammography CAD SR	1.2.840.10008.5.1.4.1.1.88.50	Table 2-13	Table 2-13	SCP	None
Key Object Selection Document	1.2.840.10008.5.1.4.1.1.88.59	Table 2-13	Table 2-13	SCP	None
Chest CAD SR	1.2.840.10008.5.1.4.1.1.88.65	Table 2-13	Table 2-13	SCP	None
X-Ray Radiation Dose SR	1.2.840.10008.5.1.4.1.1.88.67	Table 2-13	Table 2-13	SCP	None
Encapsulated PDF Storage	1.2.840.10008.5.1.4.1.1.104.1	Table 2-13	Table 2-13	SCP	None
Positron Emission Tomography Image Storage	1.2.840.10008.5.1.4.1.1.128	Table 2-13	Table 2-13	SCP	None
Radiotherapy Image Storage	1.2.840.10008.5.1.4.1.1.481.1	Table 2-13	Table 2-13	SCP	None
Radiotherapy Dose Storage	1.2.840.10008.5.1.4.1.1.481.2	Table 2-13	Table 2-13	SCP	None
Radiotherapy Structure Set Storage	1.2.840.10008.5.1.4.1.1.481.3	Table 2-13	Table 2-13	SCP	None
Radiotherapy Beams Treatment Storage	1.2.840.10008.5.1.4.1.1.481.4	Table 2-13	Table 2-13	SCP	None
Radiotherapy Plan Storage	1.2.840.10008.5.1.4.1.1.481.5	Table 2-13	Table 2-13	SCP	None
Radiotherapy Brachy Treatment Record Storage	1.2.840.10008.5.1.4.1.1.481.6	Table 2-13	Table 2-13	SCP	None
Radiotherapy Treatment Summary Record Storage	1.2.840.10008.5.1.4.1.1.481.7	Table 2-13	Table 2-13	SCP	None
Phillips Live 3D 01 (Phillips HP Sonos 7500)	1.2.840.113543.6.6.1.3.10001	Table 2-13	Table 2-13	SCP	None
Phillips Live 3D 02 (Phillips HP Sonos 7500)	1.2.840.113543.6.6.1.3.10002	Table 2-13	Table 2-13	SCP	None
GE 3D Model Image (GE Advantage 3D XR)	1.2.840.113619.4.26	Table 2-13	Table 2-13	SCP	None

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
GE PET Advance Raw Data (GE AW Raw)	1.2.840.113619.4.30	Table 2-13	Table 2-13	SCP	None

In order to send a SOP Instance, the DAS AE requires that the transfer syntax of the SOP Instance match one of the transfer syntaxes that the SCU selected for the accepted Presentation Context. If no transfer syntaxes match, the DAS AE will be not able to receive the SOP Instance.

TABLE 2-13
SUPPORTED TRANSFER SYNTAXES FOR STORED INSTANCES

Name	UID
Implicit VR Little Endian	1.2.840.10008.1.2
Explicit VR Little Endian	1.2.840.10008.1.2.1
Explicit VR Big Endian	1.2.840.10008.1.2.2
JPEG Baseline, Lossy JPEG 8-Bit Image Compression	1.2.840.10008.1.2.4.50
MPEG2 Main Profile @ Main Level	1.2.840.10008.1.2.4.100

Note: By default, the DAS AE accepts the transfer syntax of the stored Instance and in priority order as listed above. Only the transfer syntax combinations needed for IOD transfer will be utilized. Not all combinations will be used.

2.3.1.3.2.2.1 SOP Specific Conformance Statement for All Storage SOP Classes

The DAS AE provides standard conformance to the DICOM Storage Service Class as SCP.

No specialized Storage SOP Classes can be accepted.

2.3.1.3.2.2.1.1 General Behavior for all Storage SOP Classes

The SCP conforms to the DICOM Storage SOP Classes at Level 2 (full) as specified in DICOM PS 3.4, Appendix B.4.1. No elements are discarded.

All private data elements (including Unknown VR data element) will be accepted and stored as is.

The SCP will match the received Storage SOP instances to patients and studies in the Centricity PACS database via Study Profiling procedure. The Study Profiling behavior of the SCP depends on the called AE Title that the remote AE selected to request the association. See Sections 2.3.1.4.1 and 2.3.1.4.1.5.

Note: The Study Profiling procedure can cause changes of certain data elements in the SOP Instances. Centricity PACS does not regenerate a new SOP instance for the data coercion. A remote AE may receive the same SOP instance with certain data elements changed at a later time. A list of data elements that may be corrected, as well as the correction reasons, are given in Section 2.3.1.4.2.

The Study Profiling procedure has been designed to optimize its performance when a remote AE sends all SOP Instances of a study in one association (regardless of the image order in series and the series order in study). This is, however, not a required condition. The SCP is able to handle any form and any order of SOP Instances transmission either in one single association or in multiple association. But the performance of the SCP (because the AE operation is synchronized with the Study Profiling procedure) will not be optimum.

As part of the Study Profiling procedure, the DAS AE can change the status of study for the last received image to "verified" when the calling AE (SCU) closes an association. This behavior is controlled by the called AE Title selected by the remote AE. See Section 2.3.1.4.1.5 for more information.

Note: When a study is "verified" in Centricity PACS, it cannot receive any more images and the study can be read by a radiologist. The SOP Instances sent to a "verified" study (including additional new images or re-transmission of old images) will be either rejected or placed to a newly created study, depending on the called AE Title of the DAS AE receiving the instances (Section 2.3.1.4.1.5).

The SCP can validate the received SOP Instances against the DICOM Standards for data integrity. This feature can be configured as turned-on or -off (see Section 2.7.6).

The SCP will ignore the value of the C-STORE priority attribute.

If the SCP accepts a received SOP Instance for storage, the instance is stored in the Centricity PACS short-term storage cache. The SCP will store all unknown data elements as "unknown VR (UN)". Therefore, besides the data change / correction mentioned above, certain data elements may be recomputed for the sake of the data storage, like group length, sequence length, etc.

If any of timers (see Section 2.3.1.1.5) expires, the connection is closed and the operation in progress is considered failed.

The SCP will abort the association with an A-ABORT when processing of Store Requests cannot be completed because the Centricity PACS storage or database subsystem is not functioning (see Section 2.3.1.3.2.2.1.4).

2.3.1.3.2.2.1.2 Storage of SOP Instance Data Elements in Database

After having matched a SOP instance to the Patient / Study in the Centricity PACS database via the Study Profiling procedure (see Sections 2.3.1.4.1 and 2.3.1.4.1.5), certain data elements of the Storage SOP instance are saved in the database. The data elements saved in the Centricity PACS database may be subject to data coercion due to the Study Profiling procedure or Patient / Study update either by information received from RIS or manually performed by the Centricity PACS Exam Manager operator.

In addition, some data fields of Centricity PACS database have a smaller size than the size specified in the DICOM Standard. Any data values exceeding the field size of the database will be truncated.

TABLE 2-14
DATA ELEMENTS MAY BE TRUNCATED IN THE DATABASE

Data Element	DICOM Size	Database Size	Behavior
Patient's Name*	64 Char	40 Char	The person name will be first converted to the database format (see Section 2.3.1.4.1) and then truncated if the size exceeds the size allowed by the database. No warning returned to the SCU.
Referring Physician's Name*	64 Char	40 Char	The person name will be first converted to the database format (see Section 2.3.1.4.1) and then truncated if the size exceeds the size allowed by the database. No warning returned to the SCU.

*: This restriction applies to the Alphabetic Name group if the person name data element in a received data set is multi-valued. An UTF-8 text string up to 255 bytes in the Centricity PACS database is supported for both the Ideographic and Phonetic Name groups. This guarantees that these name groups are not truncated.

2.3.1.3.2.2.1.3 SOP Instance Storage and Abnormal Association Termination

2.3.1.3.2.2.1.3.1 SOP Instance Storage by SCP

It is possible for the DAS AE to fail in a manner where the cached data is unrecoverable, such as a power failure. The Storage SCU (remote AE) should use the following rules to decide if the transmitted SOP Instances have been stored safely in Centricity PACS:

If the Storage SCU requested association release (A-RELEASE) and received A-RELEASE response from the DAS AE, all successfully transmitted SOP Instances (messages) in the association have been stored in the Centricity PACS on-line storage system persistently.

If the Storage SCU issues an association abort (A-ABORT) or receives a provider-initiated abort (A-P-ABORT), the success or failure of the DAS AE to retain any object sent on the association is undefined.

If an association is terminated because of any network operation failure or time-out, the success or failure of the DAS AE to retain any object sent on the association is undefined.

The Storage SCU (remote AE) is strongly recommended to use the DICOM Storage Commitment service to verify the permanent storage status of the submitted SOP instances (see Section 8).

2.3.1.3.2.2.1.4 C-STORE Response Status

The DAS AE will return the following status codes in C-STORE-RSP message:

TABLE 2-15
STATUS CODES RETURNED IN C-STORE-RSP

Service Status	Status Code	Further Meaning	Status Code Sending Explanation	Related Fields Sent Back to SCU
Success	0000	Image Accepted	Image successfully profiled to a Study object in the Centricity PACS database.	None
Refused	A700	Out of Resources	Processing of Store Requests cannot be completed because the Centricity PACS storage or database subsystem is not functioning.	None
Error	A900	Data Set does not match SOP Class	The following generally required data elements are either missing or do not match the SOP Class: SOP Instance UID SOP Class UID Study Instance UID Series Instance UID	None
	C000	Cannot Understand	The processing of Store Requests cannot be completed due to the failure of Study Profiling (e.g., no match found and the called AE Title is unable to create a new Patient / Study).	None

If a status code of Refused or Error is returned in a C-STORE-RSP, the success or failure of the SCP to retain the SOP Instance transmitted in the corresponding C-STORE-RQ is undefined.

2.3.1.3.2.3 Presentation Context Acceptance Criterion

The DAS AE evaluates each Presentation Context independently, and accepts any Presentation Context that matches an Abstract Syntax for any Real-World Activity.

2.3.1.3.2.4 Transfer Syntax Selection Policies

The two "Transfer Syntax" columns in Table 2-12 list all transfer syntaxes that the DAS AE can accept for the DICOM Presentation Contexts proposed for the specified Abstract Syntaxes.

The DAS AE can be configured to accept one or several or all of these transfer syntaxes, for each Abstract Syntax, according to the transfer syntax selection rules specified in Section 2.3.1.3.

If several transfer syntaxes are present in a Presentation Context, the DAS AE will select a transfer syntax in the order as listed in Table 2-12.

2.3.1.3.2.5 Extended Character Sets

The use of extended character sets is fully supported. A received SOP Instance can be stored, archived and retrieved with all text information encoded with any supported character sets.

When adding the text information from the received data set to the Centricity PACS database, however, only the Person Name data elements are supported for all character sets listed in Section 2.8. Other text information will not be added to the database if they are encoded with any character set other than ISO-IR-6 or ISO-IR-100 (but these text strings still remain in the data sets, which are stored and archived).

2.3.1.3.3 Real-World Activity: Receive DICOM Storage Commitment Request from Remote AE

The DAS AE supports the N-ACTION operation for this service.

For the DICOM Conformance Statement of this service, please refer to Section 8.

The DAS AE constantly listens for incoming associations in order to receive a Storage Commitment Request (as well as DICOM Storage SOP Instances) from a remote AE.

The DAS AE is able to accept a Presentation Context for the Storage Commitment Push Model SOP Class either in a dedicated association, or in a single association together with Presentation Contexts for DICOM Storage SOP Classes. The behavior of the DAS AE with respect to the Storage Commitment service is the same in the both cases.

The DAS AE is able to service multiple DICOM associations simultaneously. The maximum number of concurrent associations that the DAS AE can accept is configurable (see Section 2.7.2 and Table 2-2).

2.3.1.3.3.1 Associated Real-World Activities

The following real-world activities are associated with the Receive Storage Commitment Request operation (refer to Figure 2-2):

- The DAS AE places a job (transaction) in the Centricity PACS Storage Commitment Queue. The job includes all SOP instances requested for Storage Commitment, as well as the calling DICOM AE Title. For each job, a timer is started when it is added to the Storage Commitment Queue.
- The DAS AE constantly polls the queue for a job which response can be sent back to the original requester.

Note: Other components of Centricity PACS will process the Storage Commitment Queue and update the status of the jobs (pending or completed or failed or time-out). This is beyond the scope of this Conformance Statement document.

2.3.1.3.3.2 Acceptable Presentation Contexts

TABLE 2-16
PROPOSED PRESENTATION CONTEXTS FOR DAS AE STORAGE COMMITMENT REQUEST

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Storage Commitment Push Model	1.2.840.10008.1.20.1	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None
Storage Commitment Push Model	1.2.840.10008.1.20.1	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
Storage Commitment Push Model	1.2.840.10008.1.20.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None

2.3.1.3.3.2.1 SOP Specific Conformance Statement for Storage Commitment Push Model SOP Class SCP

The DAS AE provides standard conformance to the DICOM Storage Commitment Service as an SCP. The DAS AE uses the DIMSE service element N-ACTION to receive a Storage Commitment Request.

The DAS AE will accept a Storage Commitment Request for both referenced SOP Instances already received (known objects) and not yet received at this moment (unknown objects). If the unknown objects are received and archived successfully at a later time (before the Storage Commitment jog timer expires), a success response will be sent to the requester.

The DAS AE will return a Success Status Code in N-ACTION-RSP to indicate that the Storage Commitment transaction is received successfully and queued in Centricity PACS for processing. A Storage Commitment Result will be sent to the remote AE via N-EVENT-REPORT operation.

The DAS AE will return a Failure Status Code in N-ACTION-RSP to indicate that the receipt of the Storage Commitment transaction failed or the transaction cannot be processed. No Storage Commitment Result will be sent to the remote AE.

2.3.1.3.3.2.1.1 N-ACTION Response Status

The DAS AE will return the following status codes in the N-ACTION-RSP message:

TABLE 2-17
STATUS CODES RETURNED IN N-ACTION-RSP

Service Status	Status Code	Further Meaning	Status Code Sending Explanation	Related Fields Sent Back to SCU
Success	0000	Success	Request succeeded	None
Error	0110	Processing Failure	A failure to process the request has occurred in the database or for other reasons.	None
	0115	Invalid Argument Value	One of several arguments to the request was missing or did not pass validation checks.	None

2.3.1.3.3.3 Presentation Context Acceptance Criterion

The DAS AE evaluates each Presentation Context independently, and accepts any Presentation Context that matches an Abstract Syntax for any Real-World Activity.

2.3.1.3.3.4 Transfer Syntax Selection Policies

The two "Transfer Syntax" columns in Table 2-12 list all transfer syntaxes that the DAS AE can accept for the DICOM Presentation Contexts proposed for the Abstract Syntax DICOM Storage Commitment Push Model SOP Class. The three transfer syntaxes are: Explicit VR Big Endian, Explicit VR Little Endian and Implicit VR Little Endian.

The DAS AE can be configured to accept one or several or all of these transfer syntaxes, for each Abstract Syntax, according to the transfer syntax selection rules specified in Section 2.3.1.3.

If several transfer syntaxes are present in a Presentation Context, the DAS AE will select a transfer syntax in the order as listed in Table 2-12.

2.3.1.3.4 Real-World Activity: Receive DICOM MPPS messages from Remote AE

The DAS AE constantly listens for incoming associations to receive a MPPS message (N-CREATE and N-SET) from a remote AE.

The DAS AE is able to accept a Presentation Context for the Modality Performed Procedure Step SOP Class either in a dedicated association, or in the same association shared by other Presentation Contexts. These include DICOM Storage (Section 2.3.1.3.1) as well as Storage Commitment SOP Classes. (Section 2.3.1.3.3).

The DAS AE is able to service multiple DICOM associations simultaneously. The maximum number of concurrent associations that the DAS AE can accept is configurable (see Section 2.7.2 and Table 2-2)

The DAS AE does not support the following DICOM SOP Classes relating to the MPPS management functionality:

- Modality Performed Procedure Step Retrieve SOP Class
- Modality Performed Procedure Step Notification SOP Class

2.3.1.3.4.1 Associated Real-World Activity

The following real-world activities are associated with the Receive MPPS Request operation (refer to Figure 2-3):

- The DAS AE will create a MPPS object or update a previously created MPPS object depending on the received DIMSE requests (N-CREATE or N-SET).
- The DAS AE will establish a link between a created MPPS object and its parent exam, to which the MPPS object contributes.
- The received DIMSE N-CREATE-RQ or N-SET-RQ messages are queued in the Centricity PACS MPPS Message Routing Queue for message forwarding, if one or more MPPS forwarding destinations have been configured in the system.

2.3.1.3.4.2 Accepted Presentation Context

TABLE 2-18
PROPOSED PRESENTATION CONTEXT FOR MPPS SCP

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Modality Performed Procedure Step SOP Class	1.2.840.10008.3.1.2.3.3	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None
Modality Performed Procedure Step SOP Class	1.2.840.10008.3.1.2.3.3	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
Modality Performed Procedure Step SOP Class	1.2.840.10008.3.1.2.3.3	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None

As shown in Table 2-18, the DAS AE can accept any of the three transfer syntaxes listed for the abstract syntax DICOM Modality Performed Procedure Step SOP Class. The DAS AE can be configured to accept the presentation syntaxes with one or several or all of these transfer syntaxes.

2.3.1.3.4.2.1 SOP Specific Conformance Statement for Modality Performed Procedure Step SOP Class

The DAS AE provides standard conformance to the Modality Performed Procedure Step SOP Class as SCP. The DAS AE uses the DIMSE service element N-CREATE and N-SET to receive the MPPS messages.

After successfully receiving and processing a MPPS N-CREATE request, the DAS AE will create and maintain a MPPS object. The DAS AE will allow updates of the MPPS object's contents by receiving and processing DIMSE N-SET messages from a remote application (see Section 2.3.1.3.4.2.1.3), until the Performed Procedure Step Status attribute (0040,0252) is updated to either "COMPLETED" or "DISCONTINUED". Once this attribute has been set to either of these values, the DAS AE will no longer accept any updates to the MPPS object. The Centricity PACS may continue the workflow based on the configuration.

After the Performed Procedure Step Status attribute (0040,0252) has been updated to either "IN PROGRESS" or "COMPLETED" or "DISCONTINUED", the DAS AE may coerce Patient and Requested Procedure information. Refer to Section 2.3.1.4.2 for more explanation on data coercion.

The DAS AE does not persistently store MPPS objects. Once an MPPS object has had its Performed Procedure Step Status attribute (0040,0252) updated to either "COMPLETED" or "DISCONTINUED", and the corresponding MPPS message has been successfully forwarded to a remote AE, the Centricity PACS may delete this MPPS object.

2.3.1.3.4.2.1.1 Receiving DIMSE N-CREATE-RQ Messages

The DAS AE accepts a DIMSE N-CREATE-RQ message for creation of a MPPS object in the Centricity PACS.

After successfully receiving and processing a MPPS N-CREATE request, the DAS AE will create and maintain a MPPS object.

If the Affected SOP Instance UID attribute is supplied in the received N-CREATE request, the DAS AE will assign this SOP Instance UID to the newly created MPPS object.

If the Affected SOP Instance UID attribute is not supplied in the received N-CREATE request, the DAS AE will generate a new SOP Instance UID for the newly created MPPS object, and return this UID in the N-CREATE response message.

If the Scheduled Step Attribute step has one or more items in the received N-CREATE request, the DAS AE will profile all the items and link to the Performed Series Sequence.

The DAS AE will support the receiving of all MPPS messages, with instances of any Storage SOP Classes referenced. In other words, if the DAS AE does not support a particular Storage SOP Class (i.e. that SOP Class is not listed in Table 2-1), the DAS AE will still be able to receive the MPPS message that references instances of this SOP Class and forward the MPPS message on, if MPPS forwarding is enabled, as described in Section 2.3.1.2.3.

2.3.1.3.4.2.1.2 Sending DIMSE N-CREATE-RSP Messages

The DAS AE will return a Success Status Code in the N-CREATE-RSP message to indicate that a MPPS object has been successfully created.

The DAS AE will return a Failure Status Code in the N-CREATE-RSP message if the received N-CREATE-RQ message cannot be processed due to the Performed Procedure Step Status attribute (0040,0252) containing a value other than "IN PROGRESS".

The DAS AE returns the following status codes in the N-CREATE-RSP message:

TABLE 2-19
STATUS CODES SUPPORTED IN MPPS N-CREATE-RSP MESSAGE

Service Status	Status Code	Further Meaning	Status Code Sending Explanation	Related Fields Sent Back to SCU
Success	0000	Success	Request succeeded	None
Error	0106	Invalid Attribute Value	One or more attributes in the request have failed verification.	None
	0110	Processing Failure	A failure to process the request has occurred in the database or for other reasons.	None
	0111	Duplicate SOP Instance	A duplicate SOP instance has been received	None
	0213	Resource Limitation	A temporary resource limitation such unavailability of the database or short term storage has occurred.	None

2.3.1.3.4.2.1.3 Receiving DIMSE N-SET-RQ Messages

The DAS AE accepts a DIMSE N-SET-RQ message for updates of a MPPS object created in the Centricity PACS by a previous N-CREATE request. The DAS AE supports the following data elements in a received N-SET request:

After Centricity PACS creates a MPPS object per an N-CREATE request, a remote DICOM application can send one or more N-SET requests to update the MPPS object in Centricity PACS. The DAS AE accepts an N-SET-RQ message and updates the requested MPPS object as long as the current status of the Performed Procedure Step Status attribute (0040,0252) is "IN PROGRESS". The status of the MPPS object is updated per the attribute value specified for the Performed Procedure Step Status attribute (0040,0252) which are both included in the N-SET request.

A MPPS status of "COMPLETED" or "DISCONTINUED" is considered a "Final State" of a MPPS object. A N-SET request will be the last update request allowed to a created MPPS object, if it updates the status of the MPPS object to one of these two values. In the last N-SET request, there are a number of required attributes which must be present as specified in Section 6. After a MPPS object has had its status changed to either "COMPLETED" or "DISCONTINUED, no further N-SET requests can be accepted for that MPPS object.

After updating the status of a MPPS object to "COMPLETED", Centricity PACS can trigger an action for workflow automation of the parent exam of the MPPS object, if the system is configured to do so.

The DAS AE will support the sending of all MPPS messages, with instances of any Send SOP Classes referenced. In other words, if the DAS AE does not support a particular Send SOP Class (i.e. that SOP Class is not listed in Table 2-1), the DAS AE will still be able to send the MPPS message that references instances of this SOP Class, if MPPS forwarding is enabled, as described in Section 2.3.1.2.3.

2.3.1.3.4.2.1.4 Sending DIMSE N-SET-RSP Messages

The DAS AE will return a Success Status Code in the N-SET-RSP message to indicate that the MPPS object has been successfully updated.

The DAS AE will return a Failure Status Code in the N-SET-RSP message for the following reasons:

- The requested MPPS object cannot be found in Centricity PACS. Failure type = No such object instance.
- Required attributes are missing in the received N-SET-RQ message. Failure type = Missing attributes.

- The requested MPPS object has previously reached the final state ("COMPLETED" or "DISCONTINUED"). The Performed Procedure Step object may no longer be updated. Failure type = Processing failure.

The DAS AE returns the following status codes in the N-SET-RSP message::

TABLE 2-20
STATUS CODES SUPPORTED IN MPPS N-SET-RSP MESSAGE

Service Status	Status Code	Further Meaning	Status Code Sending Explanation	Related Fields Sent Back to SCU
Success	0000	Success	Request succeeded	None
Error	0105	No Such Attribute	Requested SOP instance UID attribute was not found in the request.	None
	0110	Processing Failure	A failure to process the request has occurred in the database or for other reasons. Performed Procedure Step Object may no longer be updated. One N-SET-REQ message has been received previously, which updated the MPPS object to one of the final states, "COMPLETED" and "DISCONTINUED".	None
	0117	Invalid Object Instance	Requested SOP instance UID from request was not found in the database.	None
	0121	Missing Attribute Value	Referenced SOP instance UID was null in the request.	None
	0213	Resource Limitation	A temporary resource limitation such unavailability of the database or short term storage has occurred.	None

2.3.1.3.5 Real-World Activity: Receive DICOM Query Request from Remote AE

The DAS AE constantly listens for incoming associations in order to service a DICOM Query request from a remote AE.

The DAS AE is able to accept multiple DICOM associations simultaneously. The maximum number of concurrent associations that the DAS AE can accept for serving DICOM Query requests is configurable (see Section 2.7.2 and Table 2-2).

2.3.1.3.5.1 Associated Real-World Activities

The following real-world activities are associated with the C-FIND service element (response role) (refer to Figure 2-8):

- Search for patients, studies, series, or SOP instances in the Centricity PACS database.
- Send the found data sets in C-FIND responses to the remote AE.

2.3.1.3.5.2 Acceptable Presentation Contexts

Table 2-21 shows the Presentation Contexts acceptable by the DAS AE Query Provider.

TABLE 2-21
ACCEPTABLE PRESENTATION CONTEXTS FOR DAS AE – QUERY PROVIDER

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Patient Root Query/Retrieve Information Model – FIND	1.2.840.10008.5.1.4.1.2.1.1	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None
Patient Root Query/Retrieve Information Model – FIND	1.2.840.10008.5.1.4.1.2.1.1	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
Patient Root Query/Retrieve Information Model – FIND	1.2.840.10008.5.1.4.1.2.1.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
Study Root Query/Retrieve Information Model – FIND	1.2.840.10008.5.1.4.1.2.2.1	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None
Study Root Query/Retrieve Information Model – FIND	1.2.840.10008.5.1.4.1.2.2.1	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
Study Root Query/Retrieve Information Model – FIND	1.2.840.10008.5.1.4.1.2.2.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
Patient/Study Only Query/Retrieve Information Model - FIND	1.2.840.10008.5.1.4.1.2.3.1	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None
Patient/Study Only Query/Retrieve Information Model - FIND	1.2.840.10008.5.1.4.1.2.3.1	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
Patient/Study Only Query/Retrieve Information Model - FIND	1.2.840.10008.5.1.4.1.2.3.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None

2.3.1.3.5.2.1 SOP Specific Conformance Statement for Query/Retrieve Information Model – FIND SOP Classes

The SCP uses the DIMSE service element C-FIND to service a DICOM Query from a remote AE as follows:

- The DAS AE supports a DICOM Query at all levels of Patient / Study / Series / SOP Instance as specified in the supported DICOM Query/Retrieve Information Models (Table 2-21), and return the found data sets in C-FIND response.
- The DAS AE only uses the keys of supported type “Matching” (see Section 10.2) to perform the database search. Values in keys of type “Returned” will be ignored and will be filled in with data found from the database.

- Any unsupported key (not included in Section 10.2) will be ignored. No corresponding data element will be returned at all.
- The DAS AE only supports hierarchical query. No relational query is supported.
- The DAS AE searches for the data set using the matching keys specified in the C-FIND request against the Centricity PACS database.
- The DAS AE does not provide any value for the data element Storage Media File-Set ID. At the moment, the Centricity PACS system does not support any DICOM Media Storage SOP class.
- The DAS AE will ignore the data element Priority in a DICOM Query request.

Note: Due to the data coercion of the SOP Instances as described in Section 2.3.1.4.2, the return data elements can be different from the values in the DICOM Storage SOP Instances originally sent to the DAS AE.

2.3.1.3.5.2.1.1 Data Query to Centricity PACS Database

When a query specifies a searching key for a person name, the DAS AE will perform an automatic data conversion. The DAS AE converts the DICOM person name format to the person name format used in the Centricity PACS database as specified in Section 2.3.1.4.1.3, and forces a case-insensitive search in the database.

The DAS AE reserves the right to reject any query which would cause extremely large compute or I/O intensive operations during the search such as a query matching all studies in the database.

In general, the DAS AE will always return a limited number of responses to the remote Q/R SCU, if the submitted query may potentially generate a large number of matches in the database. The maximum number of returned query responses is configurable.

2.3.1.3.5.2.1.2 Supported Query Response Status Codes

The supported query response status code values are specified in Table 2-22.

TABLE 2-22
SUPPORTED QUERY RESPONSE STATUS CODES

Service Status	Status Codes	Further Meaning	Status Code Sending Explanation	Related Fields Sent Back to SCU
Failure	A700	Refused: Out of Resources	Centricity PACS raises this whenever it is unable to access the system database or the short term storage devices where SOPs are stored. It is also raised whenever a query would result in poor database performance for all other users of the system. This could occur when attempting to process open ended wildcard queries.	(0000,0900) (0000,0902)

Service Status	Status Codes	Further Meaning	Status Code Sending Explanation	Related Fields Sent Back to SCU
	A900	Identifier does not match SOP Class	Centricity PACS raises this whenever the SOP class of the request does not match that of the service being provided.	(0000,0900) (0000,0902) (0008,0048)
	C001	Unable to Process	Centricity PACS raises this under a variety of error conditions whenever it is unable to successfully start processing the request.	(0000,0900) (0000,0902) (0008,0048)
Cancel	FE00	Matching terminated due to Cancel request	Centricity PACS raises this whenever the request is cancelled.	(0000,0900)
Success	0000	Matching is Complete – No final Identifier is supplied.	Centricity PACS sends this whenever all matching is completed. No final identifier is returned.	(0000,0900) (0000,1021) (0000,1022) (0000,1023)
Pending	FF00	Matches are continuing – Current Match is supplied and any Optional Keys were supported in the same manner as Required Keys.	Centricity PACS sends this whenever an identifier is matched by the query and returns it to the SCU.	Query result for each identifier returned

2.3.1.3.5.3 Presentation Context Acceptance Criterion

The DAS AE evaluates each Presentation Context independently, and accepts any Presentation Context that matches an Abstract Syntax for any Real-World Activity.

2.3.1.3.5.4 Transfer Syntax Selection Policies

The DAS AE can be configured to accept one or several or all of these transfer syntaxes, for each Abstract Syntax, according to the transfer syntax selection rules specified in Section 2.3.1.3.

If several transfer syntaxes are present in a Presentation Context, the DAS AE will select a transfer syntax in the order as listed in Table 2-21.

2.3.1.3.6 Real-World Activity: Receive DICOM Retrieve Request from Remote AE

The DAS AE constantly listens for incoming associations to service a DIMSE C-MOVE operation issued from a remote AE.

The DAS AE accepts associations for finding the SOP Instances and sends the found SOP Instances to the destination AE specified in the C-MOVE operation, as Query/Retrieve SCP.

The DAS AE initiates associations in response to requests to move images, as DICOM Storage SCU.

The DAS AE is able to accept multiple DICOM associations simultaneously. The maximum number of concurrent associations that the DAS AE can accept for serving DICOM Retrieve requests is configurable.

The DAS AE is able to support a DIMSE C-MOVE operation at Patient, Patient/Study Only, or Study root service and within these services at Patient, Study, Series, or SOP Instance levels.

The DAS AE is able to support List of UIDs at the Study, Series, or SOP Instance level.

In addition, the DAS AE will perform a sub-operation C-STORE to transmit the requested SOP Instances.

2.3.1.3.6.1 Associated Real-World Activities

The following real-world activities are associated with the C-MOVE service element (response role) (refer to Figure 2-10):

- Search for the information of the requested SOP Instances in the Centricity PACS database and gain the access to the data files of the SOP Instances.
- Send found SOP Instances to the specified remote AE specified in the DICOM Retrieve request, if the data files are accessible.
- Send C-MOVE-RSP to the calling remote AE.

2.3.1.3.6.2 Acceptable Presentation Contexts

Table 2-23 shows the Presentation Contexts acceptable by the DAS AE Retrieve Provider.

TABLE 2-23
ACCEPTABLE PRESENTATION CONTEXTS FOR DAS AE – RETRIEVE PROVIDER

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Patient Root Query/Retrieve Information Model – MOVE	1.2.840.10008.5.1.4.1.2.1.2	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None
Patient Root Query/Retrieve Information Model – MOVE	1.2.840.10008.5.1.4.1.2.1.2	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
Patient Root Query/Retrieve Information Model – MOVE	1.2.840.10008.5.1.4.1.2.1.2	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
Study Root Query/Retrieve Information Model – MOVE	1.2.840.10008.5.1.4.1.2.2.2	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None
Study Root Query/Retrieve Information Model – MOVE	1.2.840.10008.5.1.4.1.2.2.2	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
Study Root Query/Retrieve Information Model – MOVE	1.2.840.10008.5.1.4.1.2.2.2	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Patient/Study Only Query/Retrieve Information Model - MOVE	1.2.840.10008.5.1.4.1.2.3.2	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None
Patient/Study Only Query/Retrieve Information Model - MOVE	1.2.840.10008.5.1.4.1.2.3.2	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
Patient/Study Only Query/Retrieve Information Model - MOVE	1.2.840.10008.5.1.4.1.2.3.2	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None

2.3.1.3.6.2.1 SOP Specific Conformance Statement for Query/Retrieve Information Model – MOVE SOP Classes

The DAS AE provides standard conformance to the DICOM Query/Retrieve Information Model – MOVE SOP Classes as SCP.

- The DAS AE searches for the requested SOP Instances in Centricity PACS database as specified by the Unique Key values in C-MOVE-RQ. If no requested SOP instances can be found then the DAS AE will return C-MOVE-RSP to the calling AE with a status Success. The response will equal zero for the number of completed, failed, and warning sub-operations.
- All SOP Instances requested in a C-MOVE-RQ will be sent to the destination AE over a single association. The DAS AE sends a C-MOVE-RSP with the Pending status to the SCU periodically with a configurable time interval.
- A C-MOVE-RSP will contain the number remaining, completed, failed, and warning C-STORE sub-operations.
- The DAS AE will ignore the data element Priority, if it is included in the C-MOVE request.

2.3.1.3.6.2.1.1 Supported Retrieval Response Status Codes

The supported retrieval response status code values are specified in Table 2-24.

TABLE 2-24
SUPPORTED RETRIEVAL RESPONSE STATUS CODES

Service Status	Status Codes	Further Meaning	Status Code Sending Explanation	Related Fields Sent Back to SCU
Failure	A700	Refused: Out of Resources	Centricity PACS raises this whenever it is unable to access the system database or short term storage devices where SOPs are stored.	(0000,0900) (0000,0902)

Service Status	Status Codes	Further Meaning	Status Code Sending Explanation	Related Fields Sent Back to SCU
	A701	Refused: Out of Resources – Unable to calculate number of matches	Centricity PACS raises this whenever it is unable to find the SOP instances to be retrieved.	(0000,0900) (0000,0902)
	A702	Refused: Out of Resources – Unable to perform sub-operations	Centricity PACS raises this under a variety of error conditions whenever it is unable to successfully start processing sub operations to satisfy the request.	(0000,0900) (0000,0902) (0008,0048)
	A801	Refused: Move Destination unknown	Centricity PACS raises this whenever it can't find the destination node or its network address.	(0000,0900) (0000,0902)
	A900	Identifier does not match SOP Class	Centricity PACS raises this whenever the SOP class of the request does not match that of the service being provided.	(0000,0900) (0000,0902) (0008,0048)
	C001	Unable to Process	Centricity PACS raises this under a variety of error conditions whenever it is unable to successfully start processing the request.	(0000,0900) (0000,0902) (0008,0048)
Cancel	FE00	Sub-operations terminated due to Cancel Indication	Centricity PACS raises this whenever the request is cancelled.	(0000,0900) (0000,1020) (0000,1021) (0000,1022) (0000,1023) (0008,0048)
Warning	B000	Sub-operations Complete – One or more Failures	Centricity PACS raises this under a variety of error conditions when sub operations have completed with one or more failures.	(0000,0900) (0000,1021) (0000,1022) (0000,1023) (0008,0048)
Success	0000	Sub-operations Complete – No Failures	Centricity PACS sends this whenever all sub operations complete without any failures.	(0000,0900) (0000,1021) (0000,1022) (0000,1023)

2.3.1.3.6.3 Presentation Context Acceptance Criterion

The DAS AE evaluates each Presentation Context independently, and accepts any Presentation Context that matches an Abstract Syntax for any Real-World Activity.

2.3.1.3.6.4 Transfer Syntax Selection Policies

The "Transfer Syntax" columns in Table 2-23 list all transfer syntaxes that the DAS AE can accept for the DICOM Presentation Contexts proposed for the specified Abstract Syntaxes.

The SOP classes listed in Table 2-23 can use any of different Transfer Syntaxes (i.e. Explicit VR Big Endian, Explicit VR Little Endian or Implicit VR Little Endian).

The DAS AE can be configured to accept one or several or all of these transfer syntaxes, for each Abstract Syntax, according to the transfer syntax selection rules specified in Section 2.3.1.3.

If several transfer syntaxes are present in a Presentation Context, the DAS AE will select a transfer syntax in the order as listed in Table 2-23.

2.3.1.3.6.5 Important Remarks

The DAS AE may perform a data coercion in a SOP Instance sent to the data retrieval requesting AE, in order to update the data set with the information maintained in the Centricity PACS database. See Section 2.3.1.4.2 for more details.

2.3.1.3.7 Real-World Activity: Receive DICOM GPWL Requests from Remote AE

The DAS AE constantly listens for the incoming associations in order to service a DICOM General Purpose Worklist request from a remote AE.

The DAS AE is able to accept a Presentation Context for the General Purpose Worklist Meta SOP Class either in a dedicated association or in the same association shared by other Presentation Contexts. These include DICOM Storage (Section 2.3.1.3.1) as well as Storage Commitment SOP Classes. (Section 2.3.1.3.3).

The DAS AE is able to accept multiple DICOM associations simultaneously. The maximum number of concurrent associations that the DAS AE can accept for serving DICOM GPWL Query requests is configurable (see Section 2.7.2 and Table 2-2).

2.3.1.3.7.1 Associated Real-World Activities

The following real-world activities are associated with the GPWL service request operation (refer to Figure 2-9)

- Searches for the available workitems in the Centricity PACS database.
- Sends the found workitem dataset as a GPWL response to the remote AE.
- The DAS AE will create a GP-SPS object or update a previously created GP-SPS object depending on the DIMSE requests (N-ACTION).
- The DAS AE will establish a link between a created GP-SPS object and its parent exam, to which the GP-SPS (workitem) contributes.
- The DAS AE will create a GP-PPS object or update a previously created GP-PPS object depending on the DIMSE requests (N-CREATE or N-SET)
- The received DIMSE N-CREATE-RQ or N-SET-RQ messages are queued in the Centricity PACS Message Routing Queue for message forwarding, if one or more GP-PPS forwarding destinations have been configured in the system.

2.3.1.3.7.2 Accepted Presentation Context

Table 2-25 shows the presentation contexts acceptable by the DAS AE GPWL Provider.

TABLE 2-25
ACCEPTABLE PRESENTATION CONTEXTS FOR DAS AE – GPWL PROVIDER

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
General Purpose Worklist Management Meta SOP Class	1.2.840.10008.5.1.4.32	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None
General Purpose Worklist Management Meta SOP Class	1.2.840.10008.5.1.4.32	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
General Purpose Worklist Management Meta SOP Class	1.2.840.10008.5.1.4.32	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
General Purpose Worklist Information Model – FIND SOP Class	1.2.840.10008.5.1.4.32.1	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None
General Purpose Worklist Information Model – FIND SOP Class	1.2.840.10008.5.1.4.32.1	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
General Purpose Worklist Information Model – FIND SOP Class	1.2.840.10008.5.1.4.32.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
General Purpose Scheduled Procedure Step SOP Class	1.2.840.10008.5.1.4.32.2	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None
General Purpose Scheduled Procedure Step SOP Class	1.2.840.10008.5.1.4.32.2	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
General Purpose Scheduled Procedure Step SOP Class	1.2.840.10008.5.1.4.32.2	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
General Purpose Performed Procedure Step SOP Class	1.2.840.10008.5.1.4.32.3	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
General Purpose Performed Procedure Step SOP Class	1.2.840.10008.5.1.4.32.3	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
General Purpose Performed Procedure Step SOP Class	1.2.840.10008.5.1.4.32.3	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None

2.3.1.3.7.2.1 SOP Specific Conformance Statement for GP Scheduled Procedure Step SOP Class

The DAS AE provides the conformance to the General Purpose Scheduled Procedure Step SOP Class as SCP. The DAS AE uses DIMSE service element N-ACTION to receive the GP-SPS messages.

After successfully receiving and processing the GP-SPS N-ACTION request, the DAS AE will create and maintain a GP-SPS object with General Purpose Scheduled Procedure Step Status (0040,4001) as "IN-PROGRESS". DAS AE will only process the GP-SPS message with "IN-PROGRESS" status only if the attribute Input Availability Flag (0040,4020) as "COMPLETED" which indicates the availability of all composite SOP instance in the Attribute "Input Information Sequence" (0040,4021) are readily available to access in Centricity PACS. The DAS AE will allow updates of the GP-SPS object's contents by receiving and processing the subsequent N-ACTION messages from the remote application until the General Purpose Scheduled Procedure Step Status (0040, 4001) is either "COMPLETED" or "DISCONTINUED".

If the GP-SPS object with General Purpose Scheduled Procedure Step Status (0040,4001) has "IN-PROGRESS" for a long period of time, Centricity PACS will clean the GP-SPS object based on the configuration, Similarly GP-SPS object in "DISCONTINUED" will also be cleaned. Based on the Centricity PACS configuration how long the GP-SPS object with the status of "COMPLETED" or "DISCONTINUED" will be persistent in the Centricity PACS database.

2.3.1.3.7.2.1.1 Receiving DIMSE N-ACTION-RQ Messages

The DAS AE accepts a DIMSE N-ACTION-RQ message for creation of a GP-SPS object in the Centricity PACS.

After successfully receiving and processing the GP-SPS N-ACTION request, the DAS AE will create and maintain the GP-SPS object.

2.3.1.3.7.2.1.2 Sending DIMSE N-ACTION-RSP Messages

The DAS AE will return a Success Status Code in the N-ACTION-RSP message to indicate that a GP-SPS object has been successfully created.

The DAS AE will return a Failure Status Code in the N-ACTION-RSP message if the received N-ACTION-RQ message cannot be processed due to the General Purpose Schedule Procedure Step Status attribute (0040,4001) containing a value other than "IN PROGRESS" or already "IN-

PROGRESS" or wrong transaction UID used for updating the GP-SPS message in Centricity PACS database.

The DAS AE returns the following status codes in the N-ACTION-RSP message:

TABLE 2-26
STATUS CODES RETURNED IN GP-PPS N-ACTION-RSP

Service Status	Status Code	Further Meaning	Status Code Sending Explanation	Related Fields Sent Back to SCU
Success	0000	Success	Request succeeded	None
Error	0110	Processing Failure	A failure to process the request in the database has occurred.	None
	0115	Invalid Argument Value	One of several arguments in the request was missing or did not pass validation checks.	None

2.3.1.3.7.2.2 SOP Specific Conformance Statement for GP Performed Procedure Step SOP Class

The DAS AE provides standard conformance to the General Purpose Performed Procedure Step SOP Class as SCP. The DAS AE uses the DIMSE service element N-CREATE and N-SET to receive the GP-PPS messages.

After successfully receiving and processing a GP-PPS N-CREATE request, the DAS AE will create and maintain a GP-PPS object. The DAS AE will allow updates of the GP-PPS object's contents by receiving and processing DIMSE N-SET messages from a remote application (see Section 2.3.1.3.7.2.2.3), until the General Purpose Performed Procedure Step Status attribute (0040,4002) is updated to either "COMPLETED" or "DISCONTINUED". Once this attribute has been set to either of these values, the DAS AE will no longer accept any updates to the GP-PPS object. The Centricity PACS may continue the workflow based on the configuration.

After the General Purpose Performed Procedure Step Status attribute (0040,4002) has been updated to either "IN PROGRESS" or "COMPLETED" or "DISCONTINUED", the DAS AE may coerce Patient and Requested Procedure information. Refer to Section 2.3.1.4.2 for more explanation on data coercion.

The DAS AE does not persistently store GP-PPS objects. Once an GP-PPS object has had its General Purpose Performed Procedure Step Status attribute (0040,4002) updated to either "COMPLETED" or "DISCONTINUED", and the corresponding GP-PPS message has been successfully forwarded to a remote AE, the Centricity PACS may delete this GP-PPS object.

2.3.1.3.7.2.2.1 Receiving DIMSE N-CREATE-RQ Messages

The DAS AE accepts a DIMSE N-CREATE-RQ message for creation of a GP-PPS object in the Centricity PACS.

After successfully receiving and processing a GP-PPS N-CREATE request, the DAS AE will create and maintain a GP-PPS object.

If the Affected SOP Instance UID attribute is supplied in the received N-CREATE request, the DAS AE will assign this SOP Instance UID to the newly created GP-PPS object.

If the Affected SOP Instance UID attribute is not supplied in the received N-CREATE request, the DAS AE will generate a new SOP Instance UID for the newly created GP-PPS object, and return this UID in the N-CREATE response message.

The DAS AE will support the receiving of all GP-PPS messages, with instances of any Storage SOP Classes referenced. In other words, if the DAS AE does not support a particular Storage SOP Class (i.e. that SOP Class is not listed in Table 2-1), the DAS AE will still be able to receive the GP-PPS message that references instances of this SOP Class and forward the GP-PPS message on, if GP-PPS forwarding is enabled, as described in Section 8.2.

2.3.1.3.7.2.2.2 Sending DIMSE N-CREATE-RSP Messages

The DAS AE will return a Success Status Code in the N-CREATE-RSP message to indicate that a GP-PPS object has been successfully created.

The DAS AE will return a Failure Status Code in the N-CREATE-RSP message if the received N-CREATE-RQ message cannot be processed due to the General Purpose Performed Procedure Step Status attribute (0040,4002) containing a value other than "IN PROGRESS" or Refused because Referenced General Purpose Scheduled Procedure Step Transaction UID does not match the Transaction UID of the N-ACTION request.

The DAS AE returns the following status codes in the N-CREATE-RSP :.

TABLE 2-27
STATUS CODES SUPPORTED IN GP-PPS N-CREATE-RSP MESSAGE

Service Status	Status Code	Further Meaning	Status Code Sending Explanation	Related Fields Sent Back to SCU
Success	0000	Success	Request succeeded	None
Error	0110	Processing Failure	A failure to process the request has occurred in the database or for other reasons.	None
	0213	Resource Limitation	A temporary resource limitation such unavailability of the database or short term storage has occurred.	None
	A505	Refused Unmatched Transaction ID	Transaction UID given in the request is not found or is mismatched	None

2.3.1.3.7.2.2.3 Receiving DIMSE N-SET-RQ Messages

The DAS AE accepts a DIMSE N-SET-RQ message for updates of a GP-PPS object created in the Centricity PACS by a previous N-CREATE request.

After Centricity PACS creates a GP-PPS object per an N-CREATE request, a remote DICOM application can send one or more N-SET requests to update the GP-PPS object in Centricity

PACS. The DAS AE accepts an N-SET-RQ message and updates the requested GP-PPS object as long as the current status of the General Purpose Performed Procedure Step Status attribute (0040,4002) is "IN PROGRESS". The status of the GP-PPS object is updated per the attribute value specified for the General Purpose Performed Procedure Step Status attribute (0040,4002) which are both included in the N-SET request.

A GP-PPS status of "COMPLETED" or "DISCONTINUED" is considered a "Final State" of a GP-PPS object. A N-SET request will be the last update request allowed to a created GP-PPS object, if it updates the status of the GP-PPS object to one of these two values. In the last N-SET request, there are a number of required attributes, which must be present as specified in Section 11. After a GP-PPS object has had its status changed to either "COMPLETED" or "DISCONTINUED, no further N-SET requests can be accepted for that GP-PPS object.

The DAS AE will support the sending of all GP-PPS messages, with instances of any Send SOP Classes referenced. In other words, if the DAS AE does not support a particular Send SOP Class (i.e. that SOP Class is not listed in Table 2-1), the DAS AE will still be able to send the GP-PPS message that references instances of this SOP Class, if GP-PPS forwarding is enabled,

2.3.1.3.7.2.2.4 Sending DIMSE N-SET-RSP Messages

The DAS AE will return a Success Status Code in the N-SET-RSP message to indicate that the GP-PPS object has been successfully updated.

The DAS AE will return a Failure Status Code in the N-SET-RSP message for the following reasons:

- The requested GP-PPS object cannot be found in Centricity PACS. Failure type = No such object instance.
- The requested GP-PPS object has previously reached the final state ("COMPLETED" or "DISCONTINUED"). The General Purpose Performed Procedure Step object may no longer be updated. Failure type = Processing failure.

The DAS AE returns the following status codes in the N-SET-RSP:

TABLE 2-28
STATUS CODES SUPPORTED IN GP-PPS N-SET-RSP MESSAGE

Service Status	Status Code	Further Meaning	Status Code Sending Explanation	Related Fields Sent Back to SCU
Success	0000	Success	Request succeeded	None
Error	0110	Processing Failure	A failure to process the request has occurred in the database or for other reasons.	None
	0213	Resource Limitation	A temporary resource limitation such unavailability of the database or short term storage has occurred.	None

2.3.1.3.7.2.3 SOP Specific Conformance Statement for General Purpose Worklist Information SOP Class

The DAS AE provides the conformance to the General Purpose Worklist Information SOP Class as SCP. The DAS AE uses DIMSE service element C-FIND to receive the GP-SPS messages.

After successfully receiving and processing the GPWL Query C-FIND request, the DAS AE will create workitems (i.e. GP-SPS) object with General Purpose Scheduled Procedure Step Status (0040,4001) as "SCHEDULED" based upon the Centricity PACS request procedure state and configuration.

The DAS AE will receive and process the GPWL Query C-FIND request only for the following tasks in the attribute "Scheduled Workitem Code Sequence" (0040,4018). The tasks (i.e. workitems) are list in the following table:

TABLE 2-29
SUPPORTED TASKS FOR THE GPWL SERVICE

CODING SCHEME DESIGNATOR (0008,0102)	Code Value (0008,0100)	Code Meaning (0008,0104)
DCM	110001	Image Processing
DCM	110002	Quality Control
DCM	110003	Computer Aided Diagnosis
DCM	110004	Computer Aided Detection
DCM	110005	Interpretation
DCM	110008	Print

For more information on the completed list of tasks supported by the General Purpose Worklist Meta SOP class, please refer to the PS3-16 CID 9231

2.3.1.3.7.2.3.1 Receiving DIMSE C-FIND-RQ Messages

The DAS AE accepts a DIMSE C-FIND-RQ message for query the workitems (i.e. GP-SPS) object in the Centricity PACS.

2.3.1.3.7.2.3.2 Sending DIMSE C-FIND-RSP Messages

The DAS AE will send the a DIMSE C-FIND-RSP message that may include all the attributes listed in Section 11. The list of attributes added to the C-FIND-RSP are provided by the Centricity PACS database. Each item sent in the DIMSE C-FIND-RSP message is a workitem (i.e. GP-SPS data set) object with the General Purpose Scheduled Procedure Step Status (0040,4001) as "SCHEDULED".

2.3.1.3.7.3 Extended Character Sets

The use of extended character sets is fully supported by the DAS AE. A received SOP Instance can be stored, archived and retrieved with all text information encoded with any supported character sets.

When adding the text information from the received data set to the Centricity PACS database, however, only the Person Name data elements are supported for all character sets listed in Section 2.8. Other text information will not be added to the database if they are encoded with any character set other than ISO-IR-6 or ISO-IR-100 (but these text strings still remain in the data sets, which are stored and archived).

The DAS AE may perform a data coercion in a SOP Instance sent out, in order to update the data set with the information maintained in the Centricity PACS database. The Patient's Name (0010,0010) may be multi-valued to include Ideographic and Phonetic name groups in addition to Alphabetic Name. This will be done if the receiving AE has been configured to intend to receive these additional names and these are available in Centricity PACS database. While the Alphabetic Name is always encoded with the ISO-IR-100 character set, the Ideographic and Phonetic Names can be encoded with other dual-byte character sets as listed in Section 2.8. In the current release, the DAS AE will not add text information encoded with extended character sets into other data elements.

See Centricity PACS service documentation for the peer AE configuration method.

2.3.1.4 Important Remarks

2.3.1.4.1 Study Profiling

The DAS AE will perform the Study Profiling process for each received Storage SOP Instance, in order to relate it to an ordered study object in the Centricity PACS database. The process is performed by matching the Patient / Study level data elements in the data set of the SOP instance to the Patient / Study object existing in the database.

Note: A comprehensive description of the Study Profiling process is beyond the scope of this document. See product documents of Centricity PACS for more information.

2.3.1.4.1.1 Data Elements Applied for Patient / Study Matching

Table 2-30 lists the data elements of a SOP instance used to match it to a study (of a patient) in the Centricity PACS database.

TABLE 2-30
DATA ELEMENTS USED IN STUDY PROFILING

Attribute Name	Tag
Patient's Name	(0010,0010)
Patient ID	(0010,0020)
Patient's Birth Date	(0010,0030)
Patient's Sex	(0010,0040)
Referenced Study Sequence	(0008,1110)
> Referenced SOP Class UID	(0008,1150)
> Referenced SOP Instance UID	(0008,1155)
Request Attributes Sequence	(0040,0275)
> Requested Procedure ID	(0040,1001)
Accession Number	(0008,0050)
Study Instance UID	(0020,000D)
Study ID	(0020,0010)

Attribute Name	Tag
Study Date	(0008,0020)
Study Time	(0008,0030)
Modality	(0008,0060)

Not all of these data elements are always used for a Study Profiling process. The DAS AE supports a number of separate AE Titles, which choose a subset of these data elements for a particular Study Profiling algorithm. Section 2.3.1.4.1.5 gives these AE Titles along with other properties of a Study Profiling process, like the ability of creating a new study if a matching to the existing studies failed.

2.3.1.4.1.2 Extended Character Sets in Patient's Name Text Encoding

If the Patient's Name data element in a received data set is multi-valued, only the Alphabetic Name group is applied for the patient / study matching. Other name groups are ignored for the data matching purpose. If the Alphabetic Name is absent but other name groups exist, the data set is treated as if the Patient's Name is a null length value in terms of patient / study matching.

If the Alphabetic Name is provided with character set ISO-IR-13, a transliteration process is applied to convert it into the representation of ISO-IR-6. The transliteration is performed according to the Table-II specification in the Japanese Dictionaries.

2.3.1.4.1.3 Person Name Format Conversion

Before the data elements of a SOP instance are used to search for or create data in the Centricity PACS database, Person Names supplied by the calling AE (Storage SCU) are first converted to upper case. They are then translated from DICOM format to the normal format used in reading worklists. For example, the DICOM formatted name "Last^First^Middle^Prefix^Suffix" becomes "LAST, FIRST MIDDLE PREFIX SUFFIX".

Notice that a comma has been added between the first and last names specified in the DICOM format. If a complete DICOM name comes in with no separators (^), then no comma is added to the name. In this case, the DICOM formatted name "Last First Middle Prefix Suffix" becomes "LAST FIRST MIDDLE PREFIX SUFFIX".

Note: The Person Name Conversion is performed only in the Centricity PACS database. This does not affect the format of the person name in the DICOM data set of the SOP Instances stored and archived in the Centricity PACS.

In the Centricity PACS database, a Person's Name complex is separated with the Last Name and the Rest Name including First Name, Middle Name, Prefix and Suffix, and the comma ',' is used as delimiter.

As described in Section 2.3.1.3.2.2.1.2, the Person's Name string will be truncated if it exceeds the allowed size (refer to Table 2-14).

2.3.1.4.1.4 Verified and Canceled Study

If a study matched by the Study Profiling process has a (PACS internal) status "verified" or "canceled", no more SOP Instances can be added to it. This will cause the DAS AE either to reject the received SOP Instance, or to create a new (unordered) study to host the SOP Instance, depending on the capability of the called AE Title, see Section 2.3.1.4.1.5.

The solution for this problem is to "un-verify" the study if it is "verified", or to recover the study if it is "canceled", prior to sending the SOP Instances to the study. See Centricity PACS product documents for more information about these operations.

2.3.1.4.1.5 Behavior of AE Title Selected by SCU

A number of AE Titles can be configured for the DAS AE to support different algorithms for the Study Profiling of the received SOP Instances.

The Centricity PACS system allows selection of the following elements to configure a Study Profiling algorithm (a DAS AE Title):

- A number of DICOM data elements listed in Table 2-30.
- The database fields that the DICOM data elements should be mapped to.
- A comparison operation used to match the DICOM data elements to the database fields, e.g., simple match, wildcard matching, etc.

The specified DAS AE Title will use the defined algorithm to perform the Study Profiling process for all images sent to it.

In addition to specify the matching elements for the Study Profiling algorithm, the following features can be defined for the specific DAS AEs, too:

- Patient / Exam Creation Ability. If the matching defined the Study Profiling algorithm failed or the matched exam is already "verified", a new patient and / or (unordered) study can be created in the Centricity PACS database to host these unmatched images. Disabling the Patient / Exam Creation ability causes the images to be rejected if the matching failed. If this ability is enabled, the DAS AE will use the data elements in the DICOM header of the received images to create the patient and / or exam objects.
- Automatic Study Verification. The automatic study verification refers to the ability to change the status of a study to "verified" after successful completion of one DICOM association, if the study receives one or more SOP instances in the association. The study states are defined interior the Centricity PACS system. When a study is "verified" in the Centricity PACS database, no more Storage SOP instances may be placed into the study.

Using different Study Profiling algorithms via different AE Titles is mainly to help coping with different behaviors of the imaging modalities to get the patient / study data entered and therefore to include these data items in the generated SOP instances.

The ability of configuring the specific DAS AE Titles refers to the Dynamic Profiling function of Centricity PACS. See Centricity PACS Product Documentation for more information.

2.3.1.4.2 Coercion of Data Elements

Centricity PACS supports an interface to customer HIS/RIS systems or uses Centricity PACS Exam Manager to perform necessary RIS functions. The RIS information is always assumed by Centricity PACS (either a real RIS or Centricity PACS Exam Manager) to contain more accurate Patient and Study data than the data received from the acquisition systems via DICOM Composite SOP Instances. Therefore, the RIS information is always used to correct any data entry errors. This data error correction is propagated to all DICOM Storage SOP Instances maintained in Centricity PACS.

Another reason causing the change of data elements in the SOP Instances is Study Profiling. As long as a SOP Instance is matched to an existing study in the Centricity PACS database, all data attributes of the study (as well as its upper-associated Patient) are propagated to the SOP Instance. This is because the DAS AE more trusts the "RIS data".

Also the Study Instance UID, Series Instance UID and SOP Instance UID can be changed, if they conflict with the UID values already used in the Centricity PACS database to identify another (Study, Series or SOP Instance) object.

Table 2-31 lists all data elements of the SOP Instances that may undergo a data correction in Centricity PACS. They can be different from the original values when a remote AE retrieves them from the Query/Retrieve Provider of the DAS AE.

TABLE 2-31
DATA ELEMENT COERCION OF THE SOP INSTANCES

Attribute Name	Tag	Change Reason
Patient ID	(0010,0020)	SOP Instance is associated to another patient, or wrong Patient ID is included in the data set
Patient's Name*	(0010,0010)	Wrong data in data set. Most likely manual input.
Patient's Birth Date	(0010,0030)	Wrong data in data set. Most likely manual input.
Patient's Sex	(0010,0040)	Wrong data in data set. Most likely manual input.
Other Patient IDs	(0010,1000)	Data corrected or supplemented
Study Instance UID**	(0020,000D)	SOP Instance is associated to another study
Accession Number	(0008,0050)	Wrong data in data set. Most likely manual input.
Study Date	(0008,0020)	Study with multiple steps performed on different device, Centricity PACS takes the earliest study date / time.
Study Time	(0008,0030)	See above.
Referring Physician's Name	(0008,0090)	Wrong data in data set. Most likely manual input.
Study Description	(0008,1030)	Study with multiple steps performed on different device, Centricity PACS can only take one.
Requested Procedure ID	(0040,1001)	Data corrected or supplemented
Series Instance UID**	(0020,000E)	Bad Series Instance UID in the data set
Series Number	(0020,0011)	User specific reasons.
SOP Instance UID**	(0008,0018)	Bad SOP Instance UID in the data set
Instance Number	(0020,0013)	User specific reasons.
Number of Images in Acquisition	(0020,1002)	User specific reasons.
Request Attributes Sequence	(0040,0275)	
>Requested Procedure ID	(0040,1001)	No data or wrong data in the dataset
Procedure Code Sequence	(0008,1032)	No data or Invalid data in dataset. Most likely manual input.
>Code Value	(0008,0100)	

Attribute Name	Tag	Change Reason
>Coding Scheme Designator	(0008,0102)	
>Code Meaning	(0008,0104)	

*: Patient's Name may be multi-valued and encoded with an extended character set. See Section 2.3.1.3.7.3.

**: If these UID values are changed, the original UID values are saved in the data set as private tags. See section 3 for more information.

Note: A success status value (0000H) should be returned with the C-STORE response even if coercion was applied.

2.3.1.4.3 Supported Uses of SOP Instances

Usually, Centricity PACS is applied in the radiology practice for image data management, storage, archiving, display, print, and distribution.

The DICOM Conformance Statement information specifies which DICOM Storage SOP Classes are supported by the Centricity PACS DAS as an SCP, i.e., they can be received by Centricity PACS. This does not automatically confirm that all SOP Instances can be displayed or printed or processed in a certain application.

This section gives the information of the supported uses of the received SOP Instances in Centricity PACS.

2.3.1.4.3.1 Data Storage

Centricity PACS will store all successfully received SOP Instances in its on-line storage subsystem.

2.3.1.4.3.2 Data Archiving

Centricity PACS will archive all successfully received SOP Instances in its long-term archiving subsystem. The storage duration in the long-term archiving subsystem is permanent.

Note: Although a permanent storage function is always provided for the received SOP Instances, a remote AE is strongly recommended to use the DICOM Storage Commitment Push Model SOP class to verify the archiving status of the submitted SOP Instances.

2.3.1.4.3.3 Information Query and Data Retrieval

Centricity PACS allows a remote AE to query the information and to retrieve the data sets of all stored and archived SOP Instances, using the DICOM Query/Retrieve SOP Classes.

Centricity PACS performs an information query always against the data maintained in the database.

Centricity PACS performs a data retrieval always against both the on-line storage subsystems and the long-term archiving subsystems.

Note: A remote AE may be unable to query and retrieve the SOP Instances using the original values in certain matching keys as sent to Centricity PACS previously, because of the data coercion. See Section 2.3.1.4.2.

2.3.1.4.3.4 Data Display

Centricity PACS RA1000 Workstation is able to display an image SOP Instance if it meets the conditions specified in Table 2-32 and Table 2-33.

TABLE 2-32
DISPLAYABLE SOP CLASSES

SOP Class Name	SOP Class UID
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1
Digital X-Ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.1.1
Digital X-Ray Image Storage - For Processing	1.2.840.10008.5.1.4.1.1.1.1.1
Digital Mammography X-Ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.1.2
Digital Mammography X-Ray Image Storage - For Processing	1.2.840.10008.5.1.4.1.1.1.2.1
Digital Intra-oral X-Ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.1.3
Digital Intra-oral X-Ray Image Storage - For Processing	1.2.840.10008.5.1.4.1.1.1.3.1
Computed Tomography Image Storage	1.2.840.10008.5.1.4.1.1.2
Ultrasound Multi-Frame Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.3
Ultrasound Multi-Frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1
Magnetic Resonance Image Storage	1.2.840.10008.5.1.4.1.1.4
Nuclear Medicine Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.5
Ultrasound Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.6
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7
Multi-frame Grayscale Byte Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.2
Multi-Frame Grayscale Word Secondary Capture	1.2.840.10008.5.1.4.1.1.7.3
Multi-frame True Color Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.4
Grayscale Softcopy Presentation State Storage SOP Class	1.2.840.10008.5.1.4.1.1.11.1
X-Ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1
X-Ray Radiofluoroscopic Image Storage	1.2.840.10008.5.1.4.1.1.12.2
X-Ray Angiographic Bi-plane Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.12.3

SOP Class Name	SOP Class UID
Nuclear Medicine Image Storage	1.2.840.10008.5.1.4.1.1.20
Basic Text Structured Report	1.2.840.10008.5.1.4.1.1.88.11
Key Object Selection Document	1.2.840.10008.5.1.4.1.1.88.59
Positron Emission Tomography Image Storage	1.2.840.10008.5.1.4.1.1.128
Radiotherapy Image Storage	1.2.840.10008.5.1.4.1.1.481.1

TABLE 2-33
DISPLAYABLE PHOTOMETRIC INTERPRETATION SUPPORTED

Name	Tag	Description
Photometric Interpretation	(0028,0004)	The image SOP Instance must contain one of the following Photometric Interpretation values: • MONOCHROME1 • MONOCHROME2 • RGB* • YBR_FULL* • YBR_FULL_422*

***: Centricity Enterprise Web clients are able to display the YBR_FULL and YBR_FULL_422 color images only if these are sent to the Centricity PACS using the DICOM JPEG Baseline (Process 1) Transfer Syntax.*

Centricity PACS is unable to display any non-image SOP Instance, e.g., curves.

2.3.1.4.4 DICOM Data Element List

Centricity PACS RA1000 Workstation is able to display a list of data elements in an image SOP Instance. All data elements with a group number less than 0x7FE0 can be listed.

Text information encoded with any character sets listed in Section 2.8 can be displayed, provided that the Centricity PACS RA1000 Workstation platform is appropriately configured. For the requirements for the platform configuration, see Centricity PACS documentation.

2.3.1.4.5 Patient Identifier Cross-Referencing Policies

Centricity PACS may be deployed in a hospital enterprise where multiple patient identifier (PID) Assigning Authorities exist. The PID and its Assigning Authority typically originate from within the PID-3 data element of an HL7 patient Admissions/registration, Discharge or Transfer (ADT) message. The Assigning Authority information may further flow down to image acquisition through the DICOM Modality Worklist via the attribute, Issuer of Patient ID (0010,0021), in the Patient Identification Module. This attribute, Issuer of Patient ID (0010,0021), may not be included in the Patient Module in Composite SOP Instances of devices that conform to DICOM 2003 or earlier. Change Proposal 422 (CP 422), "Add Issuer of Patient ID to Patient Module" was adopted in DICOM 2004.

Centricity PACS handles the Patient ID attribute (0010,0020) in the following way:

- If the Issuer of Patient ID (0010,0021) attribute does not exist or is blank in Composite SOP Instances, PPS messages or DICOM query keys, the attribute, Patient ID (0010,0020), will be used with a pre-configured Assigning Authority for processing.
- If the Issuer of Patient ID (0010,0021) attribute does exist and contains a known Assigning Authority, this Assigning Authority will be used with the Patient ID (0010,0020) attribute for processing.
- If the Issuer of Patient ID (0010,0021) attribute does exist but contains an unknown Assigning Authority, the patient information in Composite SOP Instances, PPS messages or DICOM query keys will be treated as unknown or invalid.

Centricity PACS also assigns a globally unique code to each Assigning Authority. This unique code is stored in a DICOM private tag (0905,xx30) with owner string "GEIIS". Centricity PACS will set this private tag when SOP Instances are acquired into the PACS. The DICOM attribute, Issuer of Patient ID (0010,0021), will also be updated, if necessary, to contain the correct Assigning Authority information and to remain in sync with the value in the private tag (0905,xx30) when SOP Instances are sent out of the PACS.

2.3.2 RA1000 AE

This section describes the Conformance Statement for information query and data retrieval functions supported in the Centricity PACS RA1000 Workstation. They are implemented in the RA1000 AE as the SCU role of the DICOM Query/Retrieve SOP Classes.

The AE title of the Query/Retrieve SCU function is different from the AE title of the Query/Retrieve SCP function. Each Centricity PACS RA1000 Workstation requires a unique AE title for the Query/Retrieve SCU function.

TABLE 2-34
CONFORMANCE LIST OF SOP CLASSES FOR RA1000 AE

SOP Class Name	SOP Class UID	SCU	SCP
Study Root Query/Retrieve Information Model – FIND	1.2.840.10008.5.1.4.1.2.2.1	Yes	N/A
Study Root Query/Retrieve Information Model – MOVE	1.2.840.10008.5.1.4.1.2.2.2	Yes	N/A

The DAS AE provides Standard Conformance to the DICOM Standard SOP Classes listed in Table 2-1 as SCP for the C-STORE sub-operations initiated in a C-MOVE context.

2.3.2.1 Association Initiation Policies

This section describes the common behaviors of the RA1000 AE with respect to the DICOM network association establishment. Specific behaviors of will be described in Section 2.3.2.2.

2.3.2.1.1 General

The DICOM Application Context Name (ACN), which is always proposed by the RA1000 AE, is:

Name	UID
DICOM Application Context Name	1.2.840.10008.3.1.1.1

The Maximum Length of PDU negotiation is included in all association establishment requests. The Maximum Length of PDU proposed for all associations initiated by the RA1000 AE is configurable (see Section 2.7.7) up to:

Maximum Length of PDU	28,672 Bytes

The user information items sent by the AEs of the RA1000 AE are:

- Maximum Length of PDU
- Implementation Class UID
- Implementation Version Name

2.3.2.1.2 Number of Associations

The RA1000 AE is able to initiate one DICOM association at a time to perform DIMSE service elements.

2.3.2.1.3 Asynchronous Nature

The RA1000 AE does not support asynchronous operations. All operations will be performed synchronously.

2.3.2.1.4 Implementation Identifying Information

The RA1000 AE provides the Implementation Class UID, which is:

Implementation Class UID	1.2.840.113619.6.94

The RA1000 AE provides the Implementation Version Name, which is:

Implementation Version Name	CENTRICITY_3.0

2.3.2.2 Association Initiation Policy

2.3.2.2.1 Real-World Activity: DICOM Query Request to Remote AE

The RA1000 AE can initiate a DICOM Query request to a remote AE at any time.

The RA1000 AE initiates a DICOM association for sending a DICOM Query Request to a remote AE by performing a C-FIND operation. The RA1000 AE can only communicate with one remote AE at a time.

2.3.2.2.1.1 Associated Real-World Activities

The user of a Centricity PACS RA1000 Workstation may want to view exams known to exist on a remote DICOM entity or may want to query a remote DICOM entity to determine if exams exist on that device. The user may also initiate a query simply to view the data provided in the query return keys. Based on the data supplied in the return keys, the user may or may not choose to retrieve the actual exams.

The Centricity PACS RA1000 Workstation user fills out the Query/Retrieve Dialog box, specifying key attributes to search for. The user then initiates the Query request. Attribute matching can be used instead of fully specified information to allow flexible queries.

The following real-world activities are associated with the C-FIND service element (request role) (refer to Figure 2-10):

- Issue a request to a remote AE to search for patients or studies in the remote AE's database.
- Receive the matched data sets in C-FIND responses from the remote AE.

2.3.2.2.1.2 Proposed Presentation Contexts

Table 2-35 shows the Presentation Context proposed by the RA1000 AE. The RA1000 AE supports three standard transfer syntaxes for the C-FIND operation.

TABLE 2-35
PROPOSED PRESENTATION CONTEXTS FOR RA1000 AE (C-FIND OPERATION)

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Study Root Query/Retrieve Information Model – FIND	1.2.840.10008.5.1.4.1.2.2.1	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None
Study Root Query/Retrieve Information Model – FIND	1.2.840.10008.5.1.4.1.2.2.1	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
Study Root Query/Retrieve Information Model – FIND	1.2.840.10008.5.1.4.1.2.2.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

The Study Root Query/Retrieve Information Model – FIND SOP classes listed in Table 2-35 can use any of different Transfer Syntaxes (i.e. Explicit VR Big Endian, Explicit VR Little Endian or Implicit VR Little Endian).

2.3.2.2.1.2.1 SOP Specific Conformance Statement for Study Root Query/Retrieve Information Model as an SCU (FIND)

The RA1000 AE provides standard conformance to the DICOM Study Root Query/Retrieve Information Model, as an SCU, according to the defined C-FIND behaviors.

2.3.2.2.1.2.1.1 General Behavior

The RA1000 AE uses the DIMSE service element C-FIND to generate a DICOM Query to a remote AE as follows:

- The RA1000 AE generates a DICOM Query at the Study Level as specified in the supported DICOM Query/Retrieve Information Model (refer to Table 2-35), and receives the found data sets in the C-FIND response.
- The RA1000 AE assumes that the remote AE is accessible and functional. If the C-FIND operation fails, the Centricity PACS RA1000 Workstation opens up a dialog box informing the user of the error.
- The RA1000 AE supports Optional Keys. The specific Optional Keys that are supported are: Modalities in Study, Number of Series Related Instances, and Referring Physician's Name.
- The RA1000 AE supports Attribute Matching in the creation of the C-FIND request. The following types of matching are supported: Single Value, List of UID, Universal, Wild Card, Range and Sequence.

- The RA1000 AE only generates hierarchical queries. It does not generate relational queries.
- The RA1000 AE does not save the DICOM Query results. They are displayed at the Centricity PACS RA1000 Workstation, but they are not saved on the Workstation or within the Centricity PACS.
- The RA1000 AE can only query one unique DICOM entity (i.e. Remote AE) at a time.
- The RA1000 AE does not support the issuance of the C-FIND-CANCEL request.

2.3.2.2.1.3 Real-World Activity: DICOM Retrieve Request to Remote AE

The RA1000 AE can initiate a DICOM Retrieve request to a remote AE after a DICOM Query Request has been performed.

The RA1000 AE initiates a DICOM association for sending a DICOM Retrieve Request to a remote AE by performing a C-MOVE operation.

The DAS AE accepts associations in response to remote AE requests to move and store images, as a DICOM Storage SCP.

2.3.2.2.1.3.1 Associated Real-World Activities

After the user of a Centricity PACS RA1000 Workstation has completed a DICOM Query operation to a remote AE and received a successful response, the Centricity PACS RA1000 Workstation will display a list of one or more studies that matched the initial Query criteria. The user may then select one of these studies or series and then initiate a retrieval request of this information from the remote AE. This action will initiate a C-MOVE request which will trigger the transfer of images from the remote system to the local database of the Centricity PACS. Note that the Centricity PACS RA1000 Workstation front-end application initiates the C-MOVE operation while the DAS responds to the resulting C-STORE operations. This type of operation is known in DICOM terminology as a "Three Device Move". The SOP Instances will eventually be stored within the Centricity PACS but will not be stored on the Centricity PACS RA1000 Workstation itself.

The following real-world activities are associated with the C-MOVE service element (request role) (refer to Figure 2-10):

- Generate a C-MOVE request to a remote AE to retrieve the studies, series, or SOP instances in the remote AE's database.
- Receive the images in C-STORE requests from the remote AE.
- Generate C-STORE responses to the remote AE.
- Receive the C-MOVE response from the remote AE.

- The DAS AE will match the received Storage SOP instances to patients and studies in the Centricity PACS database via the Study Profiling procedure. Refer to Section 2.3.1.4.1.

2.3.2.2.1.3.2 Proposed Presentation Contexts - RA1000 AE

Table 2-36 shows the Presentation Context proposed by the RA1000 AE. The RA1000 AE supports three standard transfer syntaxes for the C-MOVE operation.

TABLE 2-36
PROPOSED PRESENTATION CONTEXTS FOR RA1000 AE (C-MOVE OPERATION)

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Study Root Query/Retrieve Information Model – MOVE	1.2.840.10008.5.1.4.1.2.2.2	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None
Study Root Query/Retrieve Information Model – MOVE	1.2.840.10008.5.1.4.1.2.2.2	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
Study Root Query/Retrieve Information Model – MOVE	1.2.840.10008.5.1.4.1.2.2.2	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

The Study Root Query/Retrieve Information Model – MOVE SOP classes listed in Table 2-36 can use any of three different Transfer Syntaxes (i.e. Explicit VR Big Endian, Explicit VR Little Endian or Implicit VR Little Endian).

2.3.2.2.1.3.2.1 SOP Specific Conformance Statement for Study Root Query/Retrieve Information Model as an SCU (MOVE)

The RA1000 AE provides standard conformance to the DICOM Study Root Query/Retrieve Information Model, as an SCU, according to the defined C-MOVE behaviors.

The RA1000 AE uses the DIMSE service element C-MOVE to generate a DICOM Query to a remote AE as follows:

1. The RA1000 AE shall generate a C-MOVE Request to the remote AE. The "Move Destination" parameter of the C-MOVE Request shall contain the AE title of the DAS AE. The "Unique Key Attribute" parameter of the C-MOVE Request shall contain the list of UIDs returned in the previous query operations for selected studies or series.

2. The remote AE shall initiate an association for the C-STORE request to the DAS AE. The DAS AE shall respond to the association request.

3. The remote AE shall generate a C-STORE request to the DAS AE on a separate association.

4. The DAS AE shall receive the SOP Instance and store it into the Centricity PACS. The DAS AE shall generate a C-STORE response to the remote AE indicating a successful or unsuccessful transfer and store of the SOP Instance.
5. The remote AE may periodically send a C-MOVE response to the RA1000 AE with a "Pending" status and a count of the number of remaining, completed, failed and warning C-STORE sub-operations.
6. Steps 3 through 5 are repeated until all SOP Instances of the selected study or series are sent and loaded into the Centricity PACS.
7. The remote AE shall generate a final C-MOVE response to the RA1000 AE with a "Success" status.
8. The RA1000 AE does not support the issuance of the C-MOVE-CANCEL request.
9. The RA1000 AE does not support the issuance of C-MOVE requests at the image level. Only study or series level movement is supported.

2.3.2.3 Extended Character Sets

The RA1000 AE does not make use of the Specific Character Set (0008,0005) attribute when encoding C-MOVE requests or interpreting C-MOVE responses.

2.3.3 CDPS AE

Centricity PACS implements a DICOM Print Server (denoted CDPS for short in this section) for the PACS users to print the images to a connected DICOM Printer SCP application.

The CDPS AE provides the Standard Conformance to the DICOM Basic Grayscale Print Management Meta SOP Class, which includes the SOP Classes listed in Table 2-37.

TABLE 2-37
CONFORMANCE LIST OF SOP CLASSES FOR DICOM PRINT SERVER (CDPS) AE

SOP Class Name	SOP Class UID	SCU	SCP
Basic Film Session	1.2.840.10008.5.1.1.1	Yes	N/A
Basic Film Box	1.2.840.10008.5.1.1.2	Yes	N/A
Basic Grayscale Image Box	1.2.840.10008.5.1.1.4	Yes	N/A
Printer	1.2.840.10008.5.1.1.16	Yes	N/A

2.3.3.1 Association Establishment Policies

The CDPS AE initiates a network association to a DICOM Print SCP application for performing a print job, which may include one or more images.

2.3.3.1.1 General

The DICOM Application Context Name (ACN), which is always proposed by the CDPS AE, is

Name	UID
DICOM Application Context Name	1.2.840.10008.3.1.1.1

The Maximum Length of PDU negotiation is included in an association establishment request. The Maximum Length of PDU proposed for all associations initiated by the CDPS AE is configurable (see Section 2.7.7) up to:

Maximum Length of PDU	28,672 Bytes

The CDPS AE does not propose SOP class Extended Negotiation in any DICOM association it initiates.

The CDPS AE does not propose (SCU/SCP) Role Selection Negotiation in any DICOM association it initiates. The default role always applies; the CDPS AE plays the SCU role because it initiates an association.

The user information items sent by the CDPS AE include:

- Maximum Length of PDU
- Implementation Class UID
- Implementation Version Name

2.3.3.1.2 Number of Associations

The CDPS AE is able to initiate multiple associations to different Print SCP Application Entities at a time to perform DIMSE service elements. The maximum number of simultaneous DICOM associations that can be initiated, is determined by the total number of the remote DICOM Print SCP Application Entities known to the CDPS AE.

to each remote DICOM Print SCP Application Entity, the CDPS will not initiate another association before the currently operating association is completed.

2.3.3.1.3 Asynchronous Nature

The CDPS AE does not support asynchronous operations. All operations will be performed synchronously.

2.3.3.1.4 Implementation Identifying Information

The CDPS AE provides the Implementation Class UID, which is:

Implementation Class UID	1.2.840.113619.6.94

The CDPS AE provides the Implementation Version Name, which is:

Implementation Version Name	CENTRICITY_3.0

2.3.3.1.5 Timers

2.3.3.1.5.1 Association Timers

The CDPS AE supports an association timer, which starts when the association request is sent, and stops when the association is established.

2.3.3.1.5.2 Operation Inactivity Timer

The CDPS AE supports an operation inactivity timer, which re-starts every time a DIMSE service request has been issued.

2.3.3.2 Association Initiation Policy

2.3.3.2.1 Real-World Activity: Print Job

The CDPS AE keeps polling the print job queue of the Centricity PACS system. If one print job is retrieved, it initiates an association to the DICOM Print SCP application specified in the job, as long as there is no association currently running with the requested DICOM Print SCP application.

If another job is currently being printed, then the print job waits until the other print job is completed, and then the job is printed.

Note: If several printers are served with one DICOM Print Server, which is able to support only one DICOM Application Entity, the CDPS AE can operate only one association with the DICOM Print Server simultaneously.

2.3.3.2.1.1 Associated Read-World Activity

A Centricity PACS RA1000 Workstation user selects one or several or all images from an exam, and issues a print command. The user also specifies the film format as well as the printer that should perform the print job. Refer to Figure 2-11.

2.3.3.2.1.2 Proposed Presentation Contexts

The CDPS AE will propose the Presentation Context listed in Table 2-38 to request a print service to a remote AE.

TABLE 2-38
PROPOSED PRESENTATION CONTEXTS FOR CDPS AE AND PRINT IMAGES

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Basic Grayscale Print Management Meta SOP Class	1.2.840.10008.5.1.1.9	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None
Basic Grayscale Print Management Meta SOP Class	1.2.840.10008.5.1.1.9	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
Basic Grayscale Print Management Meta SOP Class	1.2.840.10008.5.1.1.9	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

The Basic Grayscale Print Management Meta SOP class listed in Table 2-38 can use any of three different Transfer Syntaxes (i.e. Explicit VR Big Endian, Explicit VR Little Endian or Implicit VR Little Endian).

The column "Transfer Syntax" in Table 2-38 list all transfer syntaxes that the CDPS AE can propose for the Abstract Syntax Basic Grayscale Print Management Meta SOP Class. The CDPS AE can be configured to propose the Presentation Context with one or several or all of these transfer syntaxes.

If multiple transfer syntaxes are chosen to be proposed in the Presentation Context, they are included in the order displayed in Table 2-38.

2.3.3.2.1.2.1 SOP Specific Conformance for Printer SOP Class

The CDPS AE SCU supports the following DIMSE services applicable to the Printer SOP Class:

- N-EVENT-REPORT
- N-GET

After a successful association negotiation, the CDPS AE issues an N-GET-RQ message in order to retrieve the contents of the well-known Printer SOP Instance (1.2.840.10008.5.1.1.17).

If the N-GET-RQ fails, the CDPS AE will release the association and terminate the print job.

The CDPS AE accepts N-EVENT-REPORT-RQ from the well-known Printer SOP instance at any time of the lifecycle of the print association.

The CDPS will release the association if the Printer Status Info attribute contains one of the following values in either N-GET-RSP or N-EVENT-REPORT-RQ messages received from the called AE:

- "RECEIVER FULL"
- "NO RECEIVE MGZ"
- "PRINTER INIT"
- "SUPPLY EMPTY"
- "NO SUPPLY MGZ"
- "FILM JAM"

In these conditions, the CDPS AE assumes that the called AE is not in a normal operating state to continue any print job sent to it. It is also assumed that a manual intervention is required, to correct this condition.

The CDPS AE accepts an N-EVENT-REPORT-RSP including any standard event attributes and acknowledges the receipt of the message immediately by sending an N-EVENT-REPORT-RSP message to the well-known Printer SOP instance.

Refer to Section 9.1 for additional details regarding the Printer SOP implementation.

2.3.3.2.1.2.2 SOP Specific Conformance for Basic Film Session SOP Class

The CDPS AE SCU supports the following DIMSE services applicable to the Basic Film Session SOP Class:

- N-CREATE
- N-DELETE

After a successful check of the Printer attributes (see Section 2.3.3.2.1.2.1), the CDPS AE creates a Basic Film Session by invoking N-CREATE-RQ message.

The CDPS AE waits for receiving an N-CREATE-RSP message from the called AE as response to the Basic Film Session creation request. According to the received N-CREATE-RSP message, the CDPS AE behaves as following:

- If the creation of the Basic Film Session fails, the CDPS AE releases the association and terminates the print job.

- If the creation of the Basic Film Session succeeds, the CDPS AE continues to create all film box instances for the print job. After completion of the print job, the CDPS AE deletes the Basic Film Session instance by invoking an N-DELETE-RQ message.
- Except the N-DELETE-RQ message after completion of the entire print job, the CDPS AE does not send any message to the created Basic Film Session instance. In particular, the CDPS AE never executes the print job at the Basic Film Session level by invoking an N-ACTION-RQ message to the Basic Film Session instance.

Refer to Section 9.1 for additional details on the Basic Film Session SOP implementation.

2.3.3.2.1.2.3 SOP Specific Conformance for Basic Film Box SOP Class

The CDPS AE supports the following DIMSE services applicable to the Basic Film Box SOP Class:

- N-CREATE
- N-ACTION
- N-DELETE

After successful creation of a Basic Film Session instance, the CDPS AE creates one Basic Film Box to the Basic Film Session instance.

In the N-CREATE-RSP message sent to the CDPS AE from the called AE, the CDPS AE expects to receive a set of created Basic Grayscale Image Box instances. The number of the Basic Grayscale Image Box instances should match to the Image Display Format attribute sent to the called AE.

According to the received N-CREATE-RSP message, the CDPS AE behaves as following:

- If the creation of the Basic Film Box fails, the CDPS AE releases the association and terminates the print job.
- If the creation of the Basic Film Box succeeds, the CDPS AE fills the created Image Boxes in the film box by sending the pixel data and other descriptive information (see Section 2.3.3.2.1.2.4). After successfully completion of setting all image boxes, the CDPS AE invokes an N-ACTION-RQ message to the Basic Film Box to print the film sheet. Finally, the CDPS AE deletes the Basic Film Box instance by sending an N-DELETE-RQ message to the called AE.
- If not all images have printed, the CDPS AE will create another Basic Film Box instance and repeat the operations in the last step to print the rest images.

Refer to Section 9.3 for additional details on the Basic Film Box SOP implementation.

2.3.3.2.1.2.4 SOP Specific Conformance for Basic Grayscale Image Box SOP Class

The CDPS AE supports the following DIMSE services applicable to the Basic Grayscale Image Box SOP Class:

- N-SET

For each Basic Grayscale Image Box created in the Basic Film Box (see Section 2.3.3.2.1.2.3), the CDPS AE issues a single N-SET-RQ message if an image should be printed in that Basic Grayscale Image Box. No N-SET-RQ message is sent if a Basic Grayscale Image Box should be blank (no image is printed at this location on the film sheet).

Refer to Section 9.4 for additional details on the Basic Grayscale Image Box SOP implementation.

2.3.3.3 Important Remarks

2.3.3.3.1 Supported Uses of SOP Instances

The DICOM Conformance Statement information specifies which DICOM Storage SOP Classes are supported by the Centricity PACS DAS as an SCP, i.e., they can be stored by Centricity PACS.

This does not automatically confirm that all SOP Instances can be printed.

This section gives the information of the supported uses of SOP Instances in Centricity PACS for the purposes of printing..

Note: CDPS is able to print an image SOP Instance if it meets the conditions specified in Table 2-39 and Table 2-40. Key Object Selection Document only prints supported referenced images SOP instances.

TABLE 2-39
PRINTABLE SOP CLASSES

SOP Class Name	SOP Class UID
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1
Digital X-Ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.1.1
Digital X-Ray Image Storage - For Processing	1.2.840.10008.5.1.4.1.1.1.1.1
Digital Mammography X-Ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.1.2
Digital Mammography X-Ray Image Storage - For Processing	1.2.840.10008.5.1.4.1.1.1.2.1
Digital Intra-oral X-Ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.1.3
Digital Intra-oral X-Ray Image Storage - For Processing	1.2.840.10008.5.1.4.1.1.1.3.1
Computed Tomography Image Storage	1.2.840.10008.5.1.4.1.1.2
Ultrasound Multi-Frame Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.3
Ultrasound Multi-Frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1
Magnetic Resonance Image Storage	1.2.840.10008.5.1.4.1.1.4
Nuclear Medicine Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.5
Ultrasound Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.6

SOP Class Name	SOP Class UID
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7
Multi-frame Grayscale Byte Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.2
Multi-Frame Grayscale Word Secondary Capture	1.2.840.10008.5.1.4.1.1.7.3
Multi-frame True Color Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.4
Grayscale Softcopy Presentation State Storage SOP Class	1.2.840.10008.5.1.4.1.1.11.1
X-Ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1
X-Ray Radiofluoroscopic Image Storage	1.2.840.10008.5.1.4.1.1.12.2
X-Ray Angiographic Bi-plane Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.12.3
Nuclear Medicine Image Storage	1.2.840.10008.5.1.4.1.1.20
Key Object Selection Document	1.2.840.10008.5.1.4.1.1.88.59
Positron Emission Tomography Image Storage	1.2.840.10008.5.1.4.1.1.128
Radiotherapy Image Storage	1.2.840.10008.5.1.4.1.1.481.1

TABLE 2-40
PRINTABLE PHOTOMETRIC INTERPRETATION SUPPORTED

Name	Tag	Description
Photometric Interpretation	(0028,0004)	The image SOP Instance must contain one of the following Photometric Interpretation values: • MONOCHROME1 • MONOCHROME2 • RGB* • YBR_FULL* • YBR_FULL_422*

**: The color images are converted to a grayscale representation by extracting the brightness component and printed on a grayscale printer. Centricity PACS does not support color printers.*

Centricity PACS is unable to print any non-image SOP Instance, e.g., curves.

2.4 COMMUNICATION PROFILES

2.5 SUPPORTED COMMUNICATION STACKS

DICOM Upper Layer (DICOM PS 3.8) is supported by using TCP/IP.

Note: Only IPv4 is supported at this time.

Note: DHCP configuration of the TCP/IP address information is not supported by the DAS or CDPS.

2.5.1 Physical Media Support

The GE AEs are unconstrained to the physical medium over which TCP/IP message traffic is carried. Various network interfaces are supported, including but not limited to: 10-BaseT Ethernet, 100-BaseT Ethernet, 1000-BaseT Ethernet and ATM OC-3.

The physical media supported depends on network cabling and interfaces equipment available at the Centricity PACS installation site and interface equipment commercially available.

An equipment list and configuration information for the physical media supported is available upon request.

2.6 EXTENSIONS / SPECIALIZATIONS / PRIVATIZATIONS

2.6.1 Extension / Specialization SOP Classes

The DAS AE supports the extensions to the DICOM Standard Storage SOP Classes as listed in Table 2-1. Private or standard extended data elements will be accepted for storage and archiving, and supported for SOP Instance sending and retrieve.

The DAS AE does not support any specialization SOP classes.

2.6.2 Privatized SOP Classes

The following private storage SOP classes are supported by the DAS AE.

SOP Class Name	SOP Class UID	SCU	SCP
Philips Live 3D 01 (Philips HP Sonos 7500)	1.2.840.113543.6.6.1.3.10001	Yes	Yes
Philips Live 3D 02 (Philips HP Sonos 7500)	1.2.840.113543.6.6.1.3.10002	Yes	Yes

2.6.3 Privatized Transfer Syntax

The DAS AE does not support any private transfer syntaxes.

2.7 CONFIGURATION

The exact method for configuring each configurable item is specified in other Centricity PACS documentation. The following sections only describe some items that are configurable.

2.7.1 AE Title/Presentation Address Mapping

2.7.1.1 Local AE Title

AE Titles of the DAS AE for receiving SOP Instances, Storage Commitment Requests and MPPS messages

AE Titles of the DAS AE for sending Storage Commitment Results

AE Titles of the DAS AE for sending SOP Instances and MPPS and IAN messages

AE Titles of the RA1000 AE for sending DICOM Query and Retrieve requests (one per Centricity PACS RA1000 Workstation)

AE Titles of the DAS AE for servicing DICOM Query and Retrieve requests

AE Titles of the DAS AE for sending SOP Instances in response to a C-MOVE operation

AE Titles of the DAS AE for servicing DICOM General Purpose Worklist Query requests, GP-SPS messages, GP-PPS messages

2.7.1.2 Remote AE Title

AE Titles of the remote AEs that the DAS AE will interact with, for receiving and sending SOP Instances and MPPS messages, serving Storage Commitment Requests, serving GPWL, GP-SPS, and GP-PPS requests and Query/Retrieve requests.

2.7.1.3 AE Title / Presentation Address Mapping

A local mechanism is provided to configure an AE Title / Presentation Address mapping table. This table contains the following data items for each AE entry:

- AE Title
- AE Name
- IP addresses
- TCP Port Number

2.7.2 Maximum Simultaneous Associations

The maximum number of simultaneous associations that the DAS AE and DAS AE (for Storage Commitment result) can initiate is configurable. The default value is 3. This number excludes

the RA1000 AE since each Centricity PACS RA1000 Workstation can initiate a separate association for a Query or Retrieve operation.

The maximum number of simultaneous associations that the DAS AE and can accept and that the DAS AE can initiate or accept is configurable. The default value is 25.

2.7.3 AE Title / Accepted Association Mapping

A local mechanism is provided to configure:

- A list of remote AEs that are permitted to send SOP Instances and MPPS messages and to request Storage Commitment to the DAS AE.
- A list of remote AEs that are permitted to query Patient / Study / Series / SOP Instances information and to retrieve SOP Instances from the DAS AE.
- A list of remote AEs that are permitted to send GPWL, GP-SPS, and GP-PPS messages to the DAS AEDAS AE.

2.7.4 AE Title / Association Initiation Mapping

A local mechanism is provided to configure:

- A list of remote AEs, to which the DAS AE, DAS AE and the DAS AE can initiate an association to send SOP Instances and MPPS messages.

2.7.5 Server Time-Out

Association operation inactivity time-out is 10 Minutes.

Storage Commitment job time-out by default is 120 Hours.

2.7.6 Message Validation

The DAS AE can validate incoming DICOM messages to see if the messages conform to the DICOM Standards. A configuration option turns this checking on or off.

2.7.7 Maximum PDU Size Accepted

The Maximum Length of PDU negotiated by the DAS AE, RA1000 AE, and CDPS AE is configurable up to the maximum value of 28,672 bytes.

2.8 SUPPORT FOR EXTENDED CHARACTER SETS

The DAS AE support the following character sets:

- ISO-IR-100 (ISO 8859-1), 96-Character Graphic Character Set. Right-hand Part of Latin Alphabet.

- ISO-IR-13, Japanese Katakana Character Set
- ISO-IR-87, Japanese Character Set
- ISO-IR-149, Korean Graphic Character Set

Additional character sets will be accepted for storage and data exchange however in some Application Entities, restrictions may apply to the extended character sets, see sub-sections "Extended Character Sets" in Section 2.3 for the Extended Character Sets support scopes for each Application Entity Real-World Activity.

2.9 CODES AND CONTROLLED TERMINOLOGY

The product uses no coded terminology.

2.10 SECURITY PROFILES

The product does not conform to any defined DICOM Security Profiles.

It is assumed that the product is used within a secured environment. It is assumed that a secured environment includes at a minimum:

- Firewall or router protections to ensure that only approved external hosts have network access to the product.
- Firewall or router protections to ensure that the product only has network access to approved external hosts and services.
- Any communications with external hosts and services outside the locally secured environment use appropriate secure network channels (such as a Virtual Private Network (VPN)).

3. MEDIA STORAGE CONFORMANCE STATEMENT

Centricity PACS does not provide media services in the product. The storage format of SOPs within the product is proprietary. A third party solution, DMC-EZ is offered to provide export of SOPs on a per study basis from Centricity PACS. The vendor supplies their own conformance statement upon request.

4. GRAYSCALE SOFCOPY PRESENTATION STATE IOD IMPLEMENTATION

This section specifies the use of the DICOM Grayscale Softcopy Presentation State (GSPS) IOD to represent the information included in GSPSs produced by the Centricity PACS RA1000 implementation. Corresponding attributes are conveyed using the module construct.

4.1 CENTRICITY PACS MAPPING OF DICOM ENTITIES

The Centricity PACS maps DICOM Information Entities to local Information Entities in the product's database and user interface.

TABLE 4-1
MAPPING OF DICOM ENTITIES TO CENTRICITY PACS ENTITIES

DICOM IE	Centricity PACS Entity
Patient	patient
Study	study
Series	series
Presentation State	presentation_state

4.2 IOD MODULE TABLE

The Grayscale Softcopy Presentation State Information Object Definition comprises the modules of the following table, plus Standard Extended and Private attributes. Standard Extended and Private attributes are described in Section 4.4.

TABLE 4-2
GSPS IOD MODULES

Entity Name	Module Name	Usage	Reference
Patient	Patient	Used	4.3.1.1
	Clinical Trial Subject	Not Used	N/A
Study	General Study	Used	4.3.2.1
	Patient Study	Not Used	N/A
	Clinical Trial Study	Not Used	N/A
Series	General Series	Used	4.3.3.1
	Clinical Trial Study	Not Used	N/A
	Presentation Series	Used	4.3.3.2
Equipment	General Equipment	Used	4.3.4.1
Presentation State	Presentation State Identification	Used	4.3.5.1
	Presentation State Relationship	Used	4.3.5.2
	Presentation State Shutter	Used	4.3.5.3
	Presentation State Mask	Not Used	N/A
	Mask	Not Used	N/A
	Display Shutter	Used Only if a Display Shutter is to be applied to referenced image(s).	4.3.5.4
	Bitmap Display Shutter	Used	4.3.5.5
	Overlay Plane	Used Only if Overlay is to be applied to the referenced image(s).	4.3.5.6

Entity Name	Module Name	Usage	Reference
Presentation State	Overlay Activation	Used Only if referenced image contains overlay data that is to be applied	4.3.5.7
	Displayed Area	Used	4.3.5.8
	Graphic Annotation	Used Only if Graphic Annotations are to be applied to referenced image(s)	4.3.5.9
	Spatial Transformation	Used Required if rotation or flipping are to be applied to referenced image(s)	4.3.5.10
	Graphic Layer	Used Only if Graphic Annotations or Overlays are to be applied to referenced image(s).	4.3.5.11
	Modality LUT	Used Only if a Modality LUT is to be applied to referenced image(s).	4.3.5.12
	Softcopy VOI LUT	Used Only if a VOI LUT is to be applied to referenced image(s)	4.3.5.13
	Softcopy Presentation LUT	Used	4.3.5.14
	SOP Common	Used	4.3.5.15
	Private Application	Used	4.4.1

4.3 INFORMATION MODULE DEFINITIONS

Please refer to DICOM Part 3 (Information Object Definitions) for a description of each of the entities, modules, and attributes contained within the GSPS Information Object.

The following modules are included to convey Enumerated Values, Defined Terms, and Optional Attributes supported. Type 1 & Type 2 Attributes are also included for completeness and to define what values they may take and where these values are obtained from when generating the instance. It should be noted that they are the same ones as defined in the DICOM Standard Part 3 (Information Object Definitions).

Note: Attributes not present in tables are not supported.

4.3.1 Patient Entity Modules

4.3.1.1 Patient Module

TABLE 4-3
PATIENT MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Patient's Name	(0010,0010)	2	Patient's full name.
Patient ID	(0010,0020)	2	Primary hospital identification number or code for the patient.
Issuer of Patient ID	(0010,0021)	3	Identifier of the Assigning Authority that issued the Patient ID.
Patient's Birth Date	(0010,0030)	2	Birth date of the patient.
Patient's Sex	(0010,0040)	2	Sex of the named patient.

4.3.2 Study Entity Modules

4.3.2.1 General Study Module

TABLE 4-4
GENERAL STUDY MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Study Instance UID	(0020,000D)	1	Unique identifier for the Study.
Study Date	(0008,0020)	2	Date the Study started.
Study Time	(0008,0030)	2	Time the Study started.
Referring Physician's Name	(0008,0090)	2	Name of the patient's referring physician
Study ID	(0020,0010)	2	User or equipment generated Study identifier.
Accession Number	(0008,0050)	2	A RIS generated number that identifies the order for the Study.
Referenced Study Sequence	(0008,1110)	3	A sequence that provides reference to a Study SOP Class/Instance pair.
>Referenced SOP Class UID	(0008,1150)	1	Uniquely identifies the referenced SOP Class.
>Referenced SOP Instance UID	(0008,1155)	1	Uniquely identifies the referenced SOP Instance.

4.3.3 Series Entity Modules

4.3.3.1 General Series Module

TABLE 4-5
GENERAL SERIES MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Series Instance UID	(0020,000E)	1	Unique identifier of the Series.
Series Number	(0020,0011)	2	A number that identifies this Series.
Series Date	(0008,0021)	3	Date the Series started.
Series Time	(0008,0031)	3	Time the Series started.
Series Description	(0008,103E)	3	User provided description of the Series

4.3.3.2 Presentation Series Module

TABLE 4-6
PRESENTATION SERIES MODULE ATTRIBUTES

Attribute Name	Tag	Type	Use
Modality	(0008,0060)	1	Type of equipment that originally acquired the data. For GSPS, Modality shall be PR.

4.3.4 Equipment Entity Modules

4.3.4.1 General Equipment Module

TABLE 4-7
GENERAL EQUIPMENT MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Manufacturer	(0008,0070)	2	Manufacturer of the equipment that produced the GSPS instance.
Station Name	(0008,1010)	3	User defined name identifying the machine that produced the composite instances.

Attribute Name	Tag	Type	Attribute Description
Manufacturer's Model Name	(0008,1090)	3	Manufacturer's model name of the equipment that produced the composite instances.
Software Versions	(0018,1020)	3	Manufacturer's designation of software version of the equipment that produced the composite instances.

4.3.5 Presentation State Entity Modules

4.3.5.1 Presentation State Identification Module

TABLE 4-8
PRESENTATION STATE IDENTIFICATION MODULE ATTRIBUTES

Attribute Name	Tag	Type	Use
Instance Number	(0020,0013)	1	A number that identifies this presentation (SOP Instance).
Content Label	(0070,0080)	1	A label that is used to identify this presentation. Centricity PACS supports linking two or more GSPSs that share the same Content Label within the same requested procedure. The Content Label is user entered at the time of presentation state creation on the Centricity PACS workstation. Modalities may also store multiple GSPSs for the same request procedure and have them appear linked within the Centricity PACS workstation.
Content Description	(0070,0081)	2	A description of this presentation.
Presentation Creation Date	(0070,0082)	1	Date on which this presentation was created.
Presentation Creation Time	(0070,0083)	1	Time at which this presentation was created.
Content Creator's Name	(0070,0084)	2	Name of operator saving the presentation state (such as a technologist or physician).

4.3.5.2 Presentation State Relationship Module

TABLE 4-9
PRESENTATION STATE RELATIONSHIP MODULE ATTRIBUTES

Attribute Name	Tag	Type	Use
Referenced Series Sequence	(0008,1115)	1	Sequence of Items where each Item includes the Attributes of one Series to which the Presentation applies.
>Series Instance UID	(0020,000E)	1	Unique identifier of a Series that is part of the Study to which the Presentation applies, defined by Study Instance UID (0020,000D).
>Referenced Image Sequence	(0008,1140)	1	Sequence of Items where each Item provides reference to a selected set of Image SOP Class/SOP Instance pairs to which the Presentation applies that are part of the Study defined by Study Instance UID (0020,000D) and the Series defined by Series Instance UID (0020,000E).
>>Referenced SOP Class UID	(0008,1150)	1	Uniquely identifies the referenced SOP Class.
>>Referenced SOP Instance UID	(0008,1155)	1	Uniquely identifies the referenced SOP Instance.
>>Referenced Frame Number	(0008,1160)	1C	Identifies the frame numbers within the referenced SOP Instance to which the presentation applies.

4.3.5.3 Presentation State Shutter Module

TABLE 4-10
PRESENTATION STATE SHUTTER MODULE ATTRIBUTES

Attribute Name	Tag	Type	Use
Shutter Presentation Value	(0018,1622)	1C	The value used to replace those parts of the image occluded by the shutter, in P-Values.

4.3.5.4 Display Shutter Module

TABLE 4-11
DISPLAY SHUTTER MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Shutter Shape	(0018,1600)	1	Shape(s) of the shutter defined for display. Enumerated Values: RECTANGULAR CIRCULAR POLYGONAL This multi-valued Attribute shall contain at most one of each Enumerated Value.
Shutter Left Vertical Edge	(0018,1602)	1C	Required if Shutter Shape (0018,1600) is RECTANGULAR.
Shutter Right Vertical Edge	(0018,1604)	1C	Required if Shutter Shape (0018,1600) is RECTANGULAR.
Shutter Upper Horizontal Edge	(0018,1606)	1C	Required if Shutter Shape (0018,1600) is RECTANGULAR.
Shutter Lower Horizontal Edge	(0018,1608)	1C	Required if Shutter Shape (0018,1600) is RECTANGULAR.
Center of Circular Shutter	(0018,1610)	1C	Required if Shutter Shape (0018,1600) is CIRCULAR.
Radius of Circular Shutter	(0018,1612)	1C	Required if Shutter Shape (0018,1600) is CIRCULAR.
Vertices of the Polygonal Shutter	(0018,1620)	1C	Required if Shutter Shape (0018,1600) is POLYGONAL.
Shutter Presentation Value	(0018,1622)	3	The value used to replace those parts of the image occluded by the shutter, in P-Values, from a minimum of 0000H (black) up to a maximum of FFFFH (white).

4.3.5.5 Bitmap Display Shutter Module

TABLE 4-12
BITMAP DISPLAY SHUTTER MODULE ATTRIBUTES

Attribute Name	Tag	Type	Use
Shutter Shape	(0018,1600)	1	Shape of the shutter defined for display. Enumerated Values are: BITMAP This Attribute shall contain one Value.
Shutter Overlay Group	(0018,1623)	1	The Group (60xx) of an Overlay stored within the Presentation State IOD that contains the bitmap data, as defined in the Overlay Plane Module.
Shutter Presentation Value	(0018,1622)	1	A single gray unsigned value used to replace those parts of the image occluded by the shutter, when rendered on a monochrome display. The units are specified in P-Values, from a minimum of 0000H (black) up to a maximum of FFFFH (white).

4.3.5.6 Overlay Plane Module

Centricity PACS RA1000 supports up to 16 overlay planes in an image.

TABLE 4-13
OVERLAY PLANE MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Overlay Rows	(60xx,0010)	1	Number of Rows in Overlay.
Overlay Columns	(60xx,0011)	1	Number of Columns in Overlay.
Overlay Type	(60xx,0040)	1	Indicates whether this overlay represents a region of interest or other graphics.
Overlay Origin	(60xx,0050)	1	Location of first overlay point with respect to pixels in the image, given as row\column.
Overlay Bits Allocated	(60xx,0100)	1	Number of Bits Allocated in the Overlay.
Overlay Bit Position	(60xx,0102)	1	Bit in which Overlay is stored.
Overlay Data	(60xx,3000)	1	Overlay pixel data.
Overlay Description	(60xx,0022)	3	User-defined comments about the overlay.
Overlay Subtype	(60xx,0045)	3	Defined term which identifies the intended purpose of the Overlay Type.
Overlay Label	(60xx,1500)	3	A user defined text string which may be used to label or name this overlay.
ROI Area	(60xx,1301)	3	Number of pixels in ROI area.
ROI Mean	(60xx,1302)	3	ROI Mean.
ROI Standard Deviation	(60xx,1303)	3	ROI standard deviation.

4.3.5.7 Overlay Activation Module

TABLE 4-14
OVERLAY ACTIVATION MODULE ATTRIBUTES

Attribute Name	Tag	Type	Use
Overlay Activation Layer	(60xx,1001)	2C	The layer (defined in Graphic Layer (0070,0002) of the Graphic Layer Module.

4.3.5.8 Displayed Area Module

TABLE 4-15
DISPLAYED AREA MODULE ATTRIBUTES

Attribute Name	Tag	Type	Use
Displayed Area Selection Sequence	(0070,005A)	1	A sequence of Items each of which describes the displayed area selection for a group of images or frames.
>Referenced Image Sequence	(0008,1140)	1C	Sequence of Repeating Items where each Item provides reference to a selected set of Image SOP Class/SOP Instance pairs that are defined in the Presentation State Module.
>>Referenced SOP Class UID	(0008,1150)	1	Uniquely identifies the referenced SOP Class.
>>Referenced SOP Instance UID	(0008,1155)	1	Uniquely identifies the referenced SOP Instance.
>>Referenced Frame Number	(0008,1160)	1C	Identifies the frame numbers within the referenced SOP Instance to which this displayed area selection applies.
>>Referenced Segment Number	(0062,000B)	1C	The top left (after spatial transformation) pixel in the referenced image to be displayed, given as column\row.
>Displayed Area Top Left Hand Corner	(0070,0052)	1	The bottom right (after spatial transformation) pixel in the referenced image to be displayed, given as column\row.

Attribute Name	Tag	Type	Use
>Displayed Area Bottom Right Hand Corner	(0070,0053)	1	A sequence of Items each of which describes the displayed area selection for a group of images or frames.
>Presentation Size Mode	(0070,0100)	1	Manner of selection of display size. Enumerated Values used: SCALE TO FIT TRUE SIZE MAGNIFY
>Presentation Pixel Spacing	(0070,0101)	1C	Physical distance between the center of each pixel in the referenced image (before spatial transformation), specified by a numeric pair – adjacent row spacing (delimiter) adjacent column spacing in mm.
>Presentation Pixel Aspect Ratio	(0070,0102)	1C	Ratio of the vertical size and the horizontal size of the pixels in the referenced image, to be used to display the referenced image, specified by a pair of integer values where the first value is the vertical pixel size and the second value is the horizontal pixel size.
>Presentation Pixel Magnification Ratio	(0070,0103)	1C	Ratio of displayed pixels to source pixels, specified in one dimension.

4.3.5.9 Graphic Annotation Module

TABLE 4-16
GRAPHIC ANNOTATION MODULE ATTRIBUTES

Attribute Name	Tag	Type	Use
Graphic Annotation Sequence	(0070,0001)	1	A sequence of Items each of which represents a group of annotations composed of graphics or text or both.
>Referenced Image Sequence	(0008,1140)	1C	Sequence of Repeating Items where each Item provides reference to a selected set of Image SOP Class/SOP Instance pairs that are defined in the Presentation State Module.
>>Referenced SOP Class UID	(0008,1150)	1	Uniquely identifies the referenced SOP Class.
>>Referenced SOP Instance UID	(0008,1155)	1	Uniquely identifies the referenced SOP Instance.
>>Referenced Frame Number	(0008,1160)	1C	Identifies the frame numbers within the referenced SOP Instance to which this group of annotations applies.
>Graphic Layer	(0070,0002)	1	The layer defined in the Graphic Layer Module C.
>Text Object Sequence	(0070,0008)	1C	Sequence that describes a text annotation.
>>Bounding Box Annotation Units	(0070,0003)	1C	Units of measure for the axes of the text bounding box. Enumerated Values used: PIXEL DISPLAY
>>Anchor Point Annotation Units	(0070,0004)	1C	Units of measure for the axes of the text anchor point annotation.
>>Unformatted Text Value	(0070,0006)	1	Text data which is unformatted and whose manner of display within the defined bounding box or relative to the specified anchor point is implementation dependent.
>>Bounding Box Top Left Hand Corner	(0070,0010)	1C	Location of the Top Left Hand Corner (TLHC) of the bounding box in which Unformatted Text Value (0070,0006) is to be displayed, in Bounding Box Annotation Units (0070,0003), given as column\row.
>>Bounding Box Bottom Right Hand Corner	(0070,0011)	1C	Location of the Bottom Right Hand Corner (BRHC) of the bounding box in which Unformatted Text Value (0070,0006) is to be displayed, in Bounding Box Annotation Units (0070,0003), given as column\row.

Attribute Name	Tag	Type	Use
>>Bounding Box Text Horizontal Justification	(0070,0012)	1C	Location of the text relative to the vertical edges of the bounding box.
>>Anchor Point	(0070,0014)	1C	Location of a point in the image or Specified Displayed Area to which the Unformatted Text Value (0070,0006) is related, in Anchor Point Annotation Units (0070,0004), given as column\row.
>>Anchor Point Visibility	(0070,0015)	1C	Flag to indicate whether or not a visible indication (such as a line or arrow) of the relationship between the text and the anchor point is to be displayed.
>Graphic Object Sequence	(0070,0009)	1C	Sequence that describes a graphic annotation.
>>Graphic Annotation Units	(0070,0005)	1	Units of measure for the axes of the graphic annotation. Enumerated Values used: PIXEL DISPLAY
>>Graphic Dimensions	(0070,0020)	1	Enumerated Value: 2
>>Number of Graphic Points	(0070,0021)	1	Number of data points in this graphic.
>> Graphic Data	(0070,0022)	1	Coordinates that specify this graphic annotation.
>>Graphic Type	(0070,0023)	1	The shape of graphic that is to be drawn. Enumerated Values used: POINT MULTIPOINT POLYLINE CIRCLE ELLIPSE
>>Graphic Filled	(0070,0024)	1C	Whether or not the closed graphics element is displayed as filled (in some unspecified manner that shall be distinguishable from an outline) or as an outline. Enumerated Values used: Y = yes N = no

4.3.5.10 Spatial Transformation Module

TABLE 4-17
SPATIAL TRANSFORMATION MODULE ATTRIBUTES

Attribute Name	Tag	Type	Use
Image Rotation	(0070,0042)	1	How far to rotate the image clockwise in degrees, before any Image Horizontal Flip (0070,0041) is applied. Enumerated Values used: 0 90 180 270
Image Horizontal Flip	(0070,0041)	1	Whether or not to flip the image horizontally after any Image Rotation has been applied such that the left side of the image becomes the right side. Enumerated Values used: Y = yes N = no

4.3.5.11 Graphic Layer Module

TABLE 4-18
GRAPHIC LAYER MODULE ATTRIBUTES

Attribute Name	Tag	Type	Use
Graphic Layer Sequence	(0070,0060)	1	A sequence of Items each of which represents a single layer in which overlays, curves, graphics or text may be rendered.
>Graphic Layer	(0070,0002)	1	A string which identifies the layer.
>Graphic Layer Order	(0070,0062)	1	An integer indicating the order in which it is recommended that the layer be rendered, if the display is capable of distinguishing.
>Graphic Layer Recommended Display Grayscale Value	(0070,0066)	3	A default single gray unsigned value in which it is recommended that the layer be rendered on a monochrome display.
>Graphic Layer Recommended Display RGB Value	(0070,0067)	3	A triplet of unsigned RGB values in which it is recommended that the layer be rendered on a color display.
>Graphic Layer Description	(0070,0068)	3	A free text description of the contents of this layer.

4.3.5.12 Modality LUT module

TABLE 4-19
MODALITY LUT MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Modality LUT Sequence	(0028,3000)	1C	Defines a sequence of Modality LUTs.
>LUT Descriptor	(0028,3002)	1	Specifies the format of the LUT Data in this Sequence.
>LUT Explanation	(0028,3003)	3	Free form text explanation of the meaning of the LUT.
>LUT Data	(0028,3006)	1	LUT Data in this Sequence.
Rescale Intercept	(0028,1052)	1C	The value b in relationship between stored values (SV) and the output units specified in Rescale Type (0028,1054).
Rescale Slope	(0028,1053)	1C	m in the equation specified by Rescale Intercept (0028,1052).
Rescale Type	(0028,1054)	1C	Specifies the output units of Rescale Slope (0028,1053) and Rescale Intercept (0028,1052).

4.3.5.13 Softcopy VOI LUT Module

TABLE 4-20
SOFTCOPY VOI LUT MODULE ATTRIBUTES

Attribute Name	Tag	Type	Use
Softcopy VOI LUT Sequence	(0028,3110)	1	Defines a sequence of VOI LUTs or Window Centers and Widths and to which images and frames they apply.
>Referenced Image Sequence	(0008,1140)	1C	Sequence of Repeating Items where each Item provides reference to a selected set of Image SOP Class/SOP Instance pairs that are defined in the Presentation State Module.
>>Referenced SOP Class UID	(0008,1150)	1C	Uniquely identifies the referenced SOP Class.
>>Referenced SOP Instance UID	(0008,1155)	1C	Uniquely identifies the referenced SOP Instance.
>>Referenced Frame Number	(0008,1160)	1C	Identifies the frame numbers within the referenced SOP Instance to which this VOI LUT or Window Center and Width applies.
>>Referenced Segment Number	(0062,000B)	1C	Defines a sequence of VOI LUTs.

Attribute Name	Tag	Type	Use
>VOI LUT Sequence	(0028,3010)	1C	Specifies the format of the LUT Data in this Sequence.
>>LUT Descriptor	(0028,3002)	1	Free form text explanation of the meaning of the LUT.
>>LUT Explanation	(0028,3003)	3	LUT Data in this Sequence.
>>LUT Data	(0028,3006)	1	Window Center for display.
>Window Center	(0028,1050)	1C	Window Width for display.
>Window Width	(0028,1051)	1C	Defines a sequence of VOI LUTs or Window Centers and Widths and to which images and frames they apply.

4.3.5.14 Softcopy Presentation LUT Module

TABLE 4-21
SOFTCOPY PRESENTATION LUT MODULE ATTRIBUTES

Attribute Name	Tag	Type	Use
Presentation LUT Sequence	(2050,0010)	1C	Defines a sequence of Presentation LUTs.
>LUT Descriptor	(0028,3002)	1	Specifies the format of the LUT Data in this Sequence.
>LUT Explanation	(0028,3003)	3	Free form text explanation of the meaning of the LUT.
>LUT Data	(0028,3006)	1	LUT Data in this Sequence.
Presentation LUT Shape	(2050,0020)	1C	Specifies predefined Presentation LUT transformation. Enumerated Values used: IDENTITY INVERSE

4.3.5.15 SOP Common Module

TABLE 4-22
SOP COMMON MODULE ATTRIBUTES

Attribute Name	Tag	Type	Use
SOP Class UID	(0008,0016)	1	Uniquely identifies the SOP Class.
SOP Instance UID	(0008,0018)	1	Uniquely identifies the SOP Instance.
Specific Character Set	(0008,0005)	1C	Character Set that expands or replaces the Basic Graphic Set.
Instance Creation Date	(0008,0012)	3	Date the SOP Instance was created.
Instance Creation Time	(0008,0013)	3	Time the SOP Instance was created.
Instance Number	(0020,0013)	3	A number that identifies this Composite object instance.

4.4 STANDARD EXTENDED AND PRIVATE DATA ATTRIBUTES

The Centricity PACS RA1000 does not support any additional standard attributes specified in the GSPS IOD.

The Private Attributes defined in the following sections are define as Type 3 data elements.

4.4.1 Private Group "GEIIS_RA1000"

Private Group GEIIS_RA1000 models additional attributes for the Presentation State Identification, Display Shutter, Displayed Area, Graphic Annotation, Modality LUT, and Softcopy VOI LUT modules as Type 3 data elements.

Note: Some private elements are part of standard sequences which are listed in the tables below.

TABLE 4-23
PRIVATE GROUP GEIIS_RA1000 – PRESENTATION STATE IDENTIFICATION MODULE ATTRIBUTES

Attribute Name	Tag	VR	VM	Use
Private Creator ID	(0071,00xx)	LO	1	"GEIIS_RA1000". Reserve Element Numbers 0000-00FF of group 0071 in the SOP Instance.
Private GSPS Type	(0071,xx10)	CS	1	Possible values: DISPLAYLIST, NONDISPLAYLIST

TABLE 4-24
PRIVATE GROUP GEIIS_RA1000 –DISPLAY SHUTTER MODULE ATTRIBUTES

Attribute Name	Tag	VR	VM	Use
Private Creator ID	(0019,00xx)	LO	1	"GEIIS_RA1000". Reserve Element Numbers 0000-00FF of group 0019 in the SOP Instance.
Private Shutter Shape	(0019,xx01)	CS	1	The actual shutter shape if it differs from the shape specified in the public Shutter Shape tag (0018,1600). Possible values: ELLIPTICAL

TABLE 4-25
PRIVATE GROUP GEIIS_RA1000 – DISPLAYED AREA MODULE ATTRIBUTES

Attribute Name	Tag	VR	VM	Use
Displayed Area Sequence	(0070,005A)	SQ	1	A sequence of Items each of which describes the displayed area selection for a group of images or frames. Sufficient Items shall be present to describe every image and frame listed in the Presentation State Relationship Module. One or more Items shall be included in this sequence.
>Private Creator ID	(0029,00xx)	LO	1	"GEIIS_RA1000". Reserve Element Numbers 0000-00FF of group 0029 in the SOP Instance.
>Image Rows	(0029,xx29)	US	1	
>Image Columns	(0029,xx30)	US	1	
>Relative Scale	(0029,xx32)	US	1	
>Pixel Spacing Tag	(0029,xx33)	UL	1	Contains the DICOM element tag that the value stored in Presentation Pixel Spacing came from, if known. It either indicates it came from a presentation state (00700101), or which image header tag it came from if known (00280030 or 00181164). If it came from the Centricity PACS database, the value is 0.
>Uncalibrated Pixel Spacing	(0029,xxA0)	DS	2	Pixel spacing value that was being used before a user calibrated the pixel spacing. Only written out when there is user calibrated pixel spacing.
>Calibration Pixel Spacing User	(0029,xxA1)	ST	1	The user that calibrated and saved the pixel spacing for the image

Attribute Name	Tag	VR	VM	Use
>Calibration Pixel Spacing Date	(0029,xxA2)	DA	1	The date the user calibrated the pixel spacing
>Calibration Pixel Spacing Time	(0029,xxA3)	TM	1	The time the user calibrated the pixel spacing
>Calibration Pixel Spacing Line	(0029,xxA4)	IS	4	The coordinates of the calibration line drawn by the user on the image. Value 1 is X1, value 2 is Y1, value 3, X2, and value 4 is Y2.

TABLE 4-26
PRIVATE GROUP GEIIS_RA1000 – GRAPHIC ANNOTATION MODULE ATTRIBUTES

Attribute Name	Tag	VR	VM	Use
Graphic Annotation Sequence	(0070,0001)	SQ	1	A sequence of Items each of which represents a group of annotations composed of graphics or text or both. One or more Items shall be included in this sequence.
>Private Creator ID	(0071,00xx)	LO	1	"GEIIS_RA1000". Reserve Element Numbers 0000-00FF of group 0071 in the SOP Instance.
>Annotation Stat View Order	(0071,xx23)	US	1	
>Text Object Sequence	(0070,0008)	SQ	1	Sequence that describes a text annotation. One or more Items shall be included in this sequence. Either one or both of Text Object Sequence (0070,0008) or Graphic Object Sequence (0070,0009) are required.
>>Private Creator ID	(0071,00xx)	LO	1	"GEIIS_RA1000". Reserve Element Numbers 0000-00FF of group 0071 in the SOP Instance.
>>Annotation Model Type	(0071,xx01)	CS	1	Possible values: SPINELABEL, TEXT, PIXELPOINT, INTERPOLATED and XREF..
>>Private Font Name	(0071,xx20)	ST	1	Font used for Text Annotation
>>Private Font Style	(0071,xx21)	US	1	Style code of the font used for Text Annotation
>>Private Font Size	(0071,xx22)	US	1	Point Size of the font used for Text Annotation
>>Private ID	(0071,xx24)	US	1	ID assigned to an annotation.
>Graphic Object Sequence	(0070,0009)	SQ	1	Sequence that describes a graphic annotation. One or more Items shall be included in this sequence. Either one or both of Text Object Sequence (0070,0008) or Graphic Object Sequence (0070,0009) are required.
>>Private Creator ID	(0071,00xx)	LO	1	"GEIIS_RA1000". Reserve Element Numbers 0000-00FF of group 0071 in the SOP Instance.
>>Annotation Model Type	(0071,xx01)	CS	1	Possible values: ANGLE, ARROW, LINE, OVAL, POLYGON, and RECT.
>>Private ID	(0071,xx24)	US	1	ID assigned to an annotation.

TABLE 4-27
PRIVATE GROUP GEIIS_RA1000 – MODALITY LUT MODULE ATTRIBUTES

Attribute Name	Tag	VR	VM	Use
>Private Creator ID	(0029,00xx)	LO	1	"GEIIS_RA1000". Reserve Element Numbers 0000-00FF of group 0029 in the SOP Instance.
Image Pixel Representation	(0029,xx31)	US	1	Possible values: 0 = Unsigned Pixel Representation 1 = Signed Pixel Representation

Attribute Name	Tag	VR	VM	Use
Ignore Modality LUT	(0029,xx60)	CS	1	If the value is "Y", the application will ignore the Modality LUT and instead use information read from the image header. If the value is not present or has a value of "N", the workstation application will use the Modality LUT as the only source.

TABLE 4-28
PRIVATE GROUP GEIIS_RA1000 – SOFTCOPY VOI LUT MODULE ATTRIBUTES

Attribute Name	Tag	VR	VM	Use
Softcopy VOI LUT Sequence	(0028,3110)	SQ	1	Defines a sequence of VOI LUTs or Window Centers and Widths and to which images and frames they apply. No more than one VOI LUT Sequence containing a single Item or one pair of Window Center/Width values shall be specified for each image or frame. One or more Items shall be included in this sequence.
>Private Creator ID	(0029,00xx)	LO	1	"GEIIS_RA1000". Reserve Element Numbers 0000-00FF of group 0029 in the SOP Instance.
>LUT Descriptor	(0029,xx20)	US	3	Copy of original LUT Descriptor from DICOM tag (0028,3002)/
>LUT Explanation	(0029,xx21)	LO	1	Copy of original LUT Explanation from DICOM tag (0028,3003)
>LUT Data	(0029,xx22)	US	1-n	Copy of original LUT Data from DICOM tag (0028,3006).
>Window Center	(0029,xx23)	DS	1	Window Center for Non-Linear VOI LUT
>Window Width	(0029,xx24)	DS	1	Window Width for Non-Linear VOI LUT
>Base Ramp Values	(0029,xx35)	US or SS	2	When present, two values are provided. First value is the base ramp lower bound and the second value is the base ramp upper bound. These can be either signed short integer (VR = SS) or unsigned short integer (VR = US).

4.4.2 Private Group "GEIIS PACS"

TABLE 4-29
PRIVATE GROUP "GEIIS PACS" – PATIENT MODULE ATTRIBUTES

Attribute Name	Tag	VR	VM	Use
Private Creator ID	(0905,00xx)	LO	1	"GEIIS PACS". Reserve Element Numbers 0000-00FF of group 0903 in the SOP Instance.
Assigning Authority	(0905,xx10)	LO	1	Global Assigning Authority value.

TABLE 4-30
PRIVATE GROUP "GEIIS PACS" - PRESENTATION STATE IDENTIFICATION MODULE ATTRIBUTES

Attribute Name	Tag	VR	VM	Use
Private Creator ID	(0903,00xx)	LO	1	"GEIIS PACS". Reserve Element Numbers 0000-00FF of group 0903 in the SOP Instance.
Presentation State Group Source	(0903,xx20)	CS	1	Source of the Presentation State Group. When present, the value is always "U" indicating user created presentation state.

4.5 STANDARD EXTENDED AND PRIVATE CONTEXT GROUPS

The Centricity PACS RA1000 does not support any coded terminology using Standard Extended, Private, and Configurable Context Groups.

4.6 IMPORTANT REMARKS

4.6.1 Grayscale Image Consistency

The high-resolution display monitor attached to Centricity PACS RA1000 can be calibrated according to the Grayscale Standard Display Function (GSDF). The Service/Installation Tool is used together with a luminance meter to measure the Characteristic Curve of the display system and the current ambient light.

4.6.2 Pixel Spacing Handling

The Centricity PACS RA1000 Workstation supports use of the pixel spacing attributes described below for different types of images to calculate and display information about images, including region of interest (ROI) and measurement information. The user is strongly advised to verify the logic below is compatible with the pixel spacing information provided by the modalities used at their site.

4.6.2.1 User Calibrated Pixel Spacing

The Centricity PACS RA1000 Workstation allows a user to measure and calibrate the pixel spacing for an image and save it to a GSPS object in DICOM tag (0070,0101) Presentation Pixel Spacing. Furthermore the name of the user and date/time of the calibration are saved in private DICOM tags (0029,xxA1), (0029,xxA2), and (0029,xxA3) as shown in Table 4-25. User calibrated pixel spacing takes priority over all other pixel spacing handling.

4.6.2.2 Pixel Spacing for Ultrasound Images

Since ultrasound images have different pixel spacing per region, pixel spacing from a GSPS object is generally ignored unless it was for a user calibrated pixel spacing saved by the Centricity PACS RA1000 Workstation which is indicated by the presence of private DICOM tags (0029,xxA1), (0029,xxA2), and (0029,xxA3) shown in Table 4-25. If there is no user calibrated pixel spacing provided, the Centricity PACS RA1000 Workstation will utilize the region specific pixel spacing from the DICOM tag (0018,6011) Sequence of Ultrasound Regions.

4.6.2.3 Pixel Spacing for Mammography Images

Effective with RA1000 Workstation Release 4.0 there is support for one algorithm specified in the IHE Mammography Profile for calculating distance and area measurements for mammography images. There are two preconfigured rules designed to conditionally apply the IHE Mammography Profile Algorithm to certain mammography images. If the conditions for either rule are met then the Centricity PACS RA1000 Workstation will compute measurements utilizing the value from the DICOM tag (0018,1114) Estimated

Radiographic Magnification Factor (ERMF). If the conditions for either rule are not met then no IHE algorithms are applied. The rules are:

1. Rule that Conditionally Applies ERMF Adjustment to MagView MG Images from GE Senographe Systems
2. Rule that Conditionally Applies ERMF Adjustment to Non-GE MG Images

The default configuration of these two rules is beyond the scope of this document. Refer to the RA1000 Workstation Service Manual for further information.

4.6.2.4 Pixel Spacing for non-Ultrasound Images

If a GSPS object is applied to an image, the Centricity PACS RA1000 Workstation will utilize pixel spacing information from DICOM tag (0070,0101) Presentation Pixel Spacing if present and use it in place of any pixel spacing information from the image header.

If there is no user calibrated pixel spacing and no GSPS object applied to the image display, the next source of pixel spacing is from the image header.

The Centricity PACS RA1000 Workstation will check the image header of non-ultrasound images for existence of DICOM tag (0028,0030) Pixel Spacing. If that doesn't exist, it will check for DICOM tag (0018,1164) Imager Pixel Spacing. The order of checking can be reversed by setting a workstation configuration property.

5. KEY OBJECT SELECTION DOCUMENT IOD IMPLEMENTATION

This section specifies the use of the DICOM Key Object Selection Document IOD to represent results produced by the Centricity PACS RA1000 implementation. Corresponding attributes are conveyed using the module construct.

5.1 CENTRICITY PACS MAPPING OF DICOM ENTITIES

The Centricity PACS maps DICOM Information Entities to local Information Entities in the product's database and user interface.

TABLE 5-1
MAPPING OF DICOM ENTITIES TO CENTRICITY PACS ENTITIES

DICOM IE	Centricity PACS Entity
Patient	patient
Study	exam
Series	series
Document	kos_document

5.2 IOD MODULE TABLE

The Key Object Selection Document Information Object Definitions comprise the modules of the following tables, plus Standard Extended and Private attributes. Standard Extended and Private attributes are described in Section 5.4.

The contents of the SR Document Content are constrained by the supported template, as identified in Section 5.3.2.2.1.1. Standard, Standard Extended and Private templates are further described in Section 5.6.

TABLE 5-2
KEY OBJECT SELECTION IOD MODULES

Entity Name	Module Name	Usage	Reference
Patient	Patient	Used	4.3.1.1
	Specimen Identification	Not Used	N/A
	Clinical Trial Subject	Not Used	N/A
Study	General Study	Used	4.3.2.1
	Patient Study	Not Used	N/A
	Clinical Trial Study	Not Used	N/A
Series	Key Object Document Series	Used	5.3.1.1
	Clinical Trial Series	Not Used	N/A
Equipment	General Equipment	Used	4.3.4.1
Document	Key Object Document	Used	5.3.2.1
	SR Document Content	Used	5.3.2.2
	SOP Common	Used	4.3.5.15

5.3 INFORMATION MODULE DEFINITIONS

Please refer to DICOM Part 3 (Information Object Definitions) for a description of each of the entities, modules, and attributes contained within the SR Information Objects.

The following modules are included to convey Enumerated Values, Defined Terms, and Optional Attributes supported. Type 1 & Type 2 Attributes are also included for completeness and to define what values they may take and where these values are obtained from when generating the instance. It should be noted that they are the same ones as defined in the DICOM Standard Part 3 (Information Object Definitions).

Note: Attributes not present in tables are not supported.

5.3.1 Series Entity Modules

5.3.1.1 Key Object Document Series Module

TABLE 5-3
KEY OBJECT DOCUMENT SERIES MODULE ATTRIBUTES

Attribute Name	Tag	Type	Use
Modality	(0008,0060)	1	Modality type. For the purposes of the KOS, the modality shall be KO.
Series Instance UID	(0020,000E)	1	Unique identifier of the Series.
Series Number	(0020,0011)	1	A number that identifies the Series.
Referenced Performed Procedure Step Sequence	(0008,1111)	2	Uniquely identifies the Performed Procedure Step SOP Instance for which the Series is created..

5.3.2 Document Entity Modules

5.3.2.1 Key Object Document Module

TABLE 5-4
KEY OBJECT DOCUMENT MODULE ATTRIBUTES

Attribute Name	Tag	Type	Use
Instance Number	(0020,0013)	1	A number that identifies the Document.
Content Date	(0008,0023)	1	The date the document content creation started.
Content Time	(0008,0033)	1	The time the document content creation started.
Referenced Request Sequence	(0040,A370)	1C	Identifies Requested Procedures to which this Document pertains.
>Study Instance UID	(0020,000D)	1	Unique identifier for the Study.
>Referenced Study Sequence	(0008,1110)	2	Uniquely identifies the Study SOP Instance.
>>Referenced SOP Class UID	(0008,1150)	1	Uniquely identifies the referenced SOP Class.
>>Referenced SOP Instance UID	(0008,1155)	1	Uniquely identifies the referenced SOP Instance.
>Accession Number	(0008,0050)	2	A departmental IS generated number which identifies the order for the Study.
>Placer Order Number/Imaging Service Request	(0040,2016)	2	The order number assigned to the Imaging Service Request by the party placing the order.
>Filler Order Number/Imaging Service Request	(0040,2017)	2	The order number assigned to the Imaging Service Request by the party filling the order.
>Requested Procedure ID	(0040,1001)	2	Identifier of the related Requested Procedure.
>Requested Procedure Description	(0032,1060)	2	Institution-generated administrative description or classification of Requested Procedure.

Attribute Name	Tag	Type	Use
>Requested Procedure Code Sequence	(0032,1064)	2	A sequence that conveys the requested procedure.
>>Include 'Code Sequence Macro'			
Current Requested Procedure Evidence Sequence	(0040,A375)	1	List of all Composite SOP Instances referenced in the Content Sequence (0040,A730).
>Include 'Hierarchical SOP Instance Reference Macro'			

5.3.2.2 SR Document Content Module

TABLE 5-5
SR DOCUMENT CONTENT MODULE ATTRIBUTES

Attribute Name	Tag	Type	Use
Observation DateTime	(0040,A032)	1C	
Content Template Sequence	(0040,A504)	1C	
>Mapping Resource	(0008,0105)	1	
>Template Identifier	(0040,DB00)	1	
Value Type	(0040,A040)	1	
Continuity of Content	(0040,A050)	1C	
Concept Name Code Sequence	(0040,A043)	1C	
>Include 'Code Sequence Macro'			
Insert Concept Value attribute(s)			
Content Sequence	(0040,A730)	1C	
> Relationship Type	(0040,A010)	1	
> Referenced Content Item Identifier	(0040,DB73)	1C	Not used in Basic Text and Enhanced SR SOP Classes
> Insert SR DocumentContent Module			Recursive inclusion to create document content tree. See section 5.3.2.2.1 for the list of supported templates

5.3.2.2.1 SR Document Content Descriptions

5.3.2.2.1.1 Content Template

The product supports the following root Templates for SR SOP Instances created, processed, or displayed by the product.

TABLE 5-6
SR ROOT TEMPLATES

SOP Class	Template ID	Template Name	Use
Key Object Selection Document	2010	Key Object Selection	Create/Display

Refer to section 5.6 for a detailed description of the supported templates.

5.4 STANDARD EXTENDED AND PRIVATE DATA ATTRIBUTES

Centricity PACS RA1000 does not support any Standard Extended or Private Attributes for KOS SOP instances.

5.5 STANDARD EXTENDED AND PRIVATE CONTEXT GROUPS

Centricity PACS RA1000 does not support any coded terminology using Standard Extended, Private, and Configurable Context Groups for KOS SOP instances.

5.6 STANDARD, STANDARD EXTENDED AND PRIVATE TEMPLATES

5.6.1 Standard Templates

Centricity PACS RA1000 supports the following standard templates for KOS SOP Instances created by this product.

5.6.1.1 Template ID 2010 Key Object Selection

TABLE 5-7
TID 2010 – KEY OBJECT SELECTION TEMPLATE

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Usage
1			CONTAINER	CID(7010) Key Object Selection Document Titles	1	M	Used
2	>	HAS CONCEPT MOD	CODE	(113011, DCM, "Document Title Modifier")	1-n	U	Used
3	>	HAS CONCEPT MOD	CODE	(113011, DCM, "Document Title Modifier")	1	UC	Used When Concept Name is (113001, DCM, "Rejected for Quality Reasons") or (113010, DCM," Quality Issue")
4	>	HAS CONCEPT MOD	CODE	(113011, DCM, "Document Title Modifier")	1	MC	Used When Concept Name is (113013, DCM, "Best In Set")
5	>	HAS CONCEPT MOD	INCLUDE	TID(1204) Language of Content Item and Descendants	1	U	Used
6	>	HAS OBS CONTEXT	INCLUDE	TID(1002) Observer Context	1-n	U	Used Only one instance is supported
7	>	CONTAINS	TEXT	(113012, DCM, "Key Object Description")	1	U	Used
8	>	CONTAINS	IMAGE	Purpose of Reference shall not be present	1-n	MC	Used
9	>	CONTAINS	WAVEFORM	Purpose of Reference shall not be present	1-n	MC	Not Supported
10	>	CONTAINS	COMPOSITE	Purpose of Reference shall not be present	1-n	MC	Not Supported

TABLE 5-8
TID 1204 – LANGUAGE OF CONTENT ITEM AND DESCENDANTS

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Usage
1		HAS CONCEPT MOD	CODE	(121049,DCM,"Language of Content Item and Descendants")	1	M	Used
2	>	HAS CONCEPT MOD	CODE	(121046,DCM,"Country of Language")	1	U	Not Used

TABLE 5-9
TID 1002 – OBSERVER CONTEXT

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Usage
1		HAS OBS CONTEXT	CODE	(121005,DCM, "Observer Type")	1	MC	Used Observer Type is always (121006,DCM, "Person")
2		HAS OBS CONTEXT	INCLUDE	TID (1003) Person observer identifying attributes	1	MC	Used
3		HAS OBS CONTEXT	INCLUDE	TID (1004) Device observer identifying attributes	1	MC	Not Supported

TABLE 5-10
TID 1003 – PERSON OBSERVER IDENTIFYING ATTRIBUTES

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Usage
1			PNAME	(121008,DCM, "Person Observer Name")	1	M	Used
2			TEXT	(121009,DCM, "Person Observer's Organization Name")	1	U	Not Used
3			CODE	(121010,DCM, "Person Observer's Role in the Organization")	1	U	Not Used
4			CODE	(121011,DCM, "Person Observer's Role in this Procedure")	1	U	Not Used

5.6.2 Standard Extended Templates

The Centricity PACS RA1000 does not support the extensions or restrictions to standard templates for SOP Instances created by this product.

5.6.3 Private Templates

The Centricity PACS RA1000 does not support private templates for SOP Instances created by this product.

6. MODALITY PERFORMED PROCEDURE STEP IMPLEMENTATION

This section specifies the use of the DICOM Modality Performed Procedure Step information to be communicated to the Hospital/Radiology information system.

This feature works in conjunction with DICOM Modality Worklist feature, if installed. However the conformance of this feature is independent of Modality Worklist feature. For information on DICOM conformance of Modality Worklist feature within Centricity PACS please refer to the Centricity Clinical Gateway DICOM Conformance Statement.

The Centricity PACS DAS AE supports a MPPS SCP as part of Storage Services. MPPS message instances received can be acted upon for the purpose of profiling and scheduled procedure matching.

The Centricity PACS DAS AE Send Services supports a MPPS SCU to forward MPPS instances received by the DAS AE intact to one or more configurable MPPS SCP AEs which can include RIS or other systems.

Note: The conformance of forwarded MPPS message instances is upon the original producing system and not Centricity PACS.

The DAS AE MPPS SCU also has the ability to generate pseudo MPPS message instances upon acquisition and completion events in Centricity PACS to support modalities that do not have the ability to generate MPPS.

The conformance shown in the following sections represent the pseudo MPPS message instances generated by Centricity PACS.

6.1 RELATIONSHIP BETWEEN SCHEDULED AND PERFORMED PROCEDURE STEPS

The Centricity PACS data model assumes a one-to-one relationship between Requested Procedure and Scheduled Procedure Step entities and therefore collapses the data from the Scheduled Procedure Step into the Requested Procedure entity.

Many RIS systems do not support the expanded data model of one Requested Procedure to many Scheduled Procedure Steps, therefore making the addition of multiple Scheduled Procedure Steps unnecessary for Centricity PACS. This may change in the future, but for now is a limitation.

Centricity PACS supports a many-to-many relationship between the Requested Procedure and Performed Procedure Steps to allow for handling group cases and append/post-processing cases. Centricity PACS also allows for a zero-to-one relationship to allowed for acquisition of unscheduled cases or acquisition without MWL data.

6.2 MODALITY PERFORMED PROCEDURE STEP MODULE TABLE

See DICOM PS 3.3 and PS 3.4 for a complete definition of the entities, modules, and attributes.

TABLE 6-1
MODALITY PERFORMED PROCEDURE STEP MODULES

Module Name	Reference
SOP Common	6.3.1
Performed Procedure Step Relationship	6.3.2
Performed Procedure Step Information	6.3.3
Image Acquisition Results	6.3.4
Radiation Dose	N/A
Billing and Material Management Codes	N/A

6.3 MODALITY PERFORMED PROCEDURE STEP MODULE DEFINITIONS

Please refer to DICOM Standard PS 3.3. (Information Object Definitions) for a description of each of the attributes contained within the Modality Performed Procedure Step Information Object Definition.

6.3.1 SOP Common Module

TABLE 6-2
SOP COMMON MODULE ATTRIBUTES

Attribute Name	Tag	Type N-CREATE (SCU)	Type N-SET (SCU/SCP)	Use
Specific Character Set	(0008,0005)	1C	Not allowed	Supported Only ISO-IR-100 (ISO 8859-1) No other extended character sets are supported

6.3.2 Performed Procedure Step Relationship Module

TABLE 6-3
PERFORMED PROCEDURE STEP RELATIONSHIP MODULE ATTRIBUTES

Attribute Name	Tag	Type N-CREATE (SCU)	Type N-SET (SCU)	Use
Scheduled Step Attributes Sequence	(0040,0270)	1	Not allowed	Supported Multiple entries may exist for grouped cases.
>Study Instance UID	(0020,000D)	1	Not allowed	Supported
>Referenced Study Sequence	(0008,1110)	2	Not allowed	Supported
>>Referenced SOP Class UID	(0008,1150)	1	Not allowed	Supported
>>Referenced SOP Instance UID	(0008,1155)	1	Not allowed	Supported
>Accession Number	(0008,0050)	2	Not allowed	Supported
>Issuer of Accession Number Sequence	(0008,0051)	3	Not allowed	Not Supported
>>Local Namespace Entity ID	(0040,0031)	1C	Not allowed	
>>Universal Entity ID	(0040,0032)	1C	Not allowed	
>>Universal Entity ID Type	(0040,0033)	1C	Not allowed	
>Placer Order Number/Imaging Service Request	(0040,2016)	3	Not allowed	Not Supported
>Order Placer Identifier Sequence	(0040,0026)	3	Not allowed	Not Supported
>>Local Namespace Entity ID	(0040,0031)	1C	Not allowed	

Attribute Name	Tag	Type N-CREATE (SCU)	Type N-SET (SCU)	Use
>>Universal Entity ID	(0040,0032)	1C	Not allowed	
>>Universal Entity ID Type	(0040,0033)	1C	Not allowed	
>Filler Order Number/Imaging Service Request	(0040,2017)	3	Not allowed	Not Supported
>Order Filler Identifier Sequence	(0040,0027)	3	Not allowed	Not Supported
>>Local Namespace Entity ID	(0040,0031)	1C	Not allowed	
>>Universal Entity ID	(0040,0032)	1C	Not allowed	
>>Universal Entity ID Type	(0040,0033)	1C	Not allowed	
>Requested Procedure ID	(0040,1001)	2	Not allowed	Supported
>Requested Procedure Code Sequence	(0032,1064)	3	Not allowed	Not Supported
>>Code Value	(0008,0100)	1	Not allowed	
>>Coding Scheme Designator	(0008,0102)	1	Not allowed	
>>Code Meaning	(0008,0104)	1	Not allowed	
>Requested Procedure Description	(0032,1060)	2	Not allowed	Supported
>Scheduled Procedure Step ID	(0040,0009)	2	Not allowed	Supported – zero-length value
>Scheduled Procedure Step Description	(0040,0007)	2	Not allowed	Supported – zero-length value
>Scheduled Protocol Code Sequence	(0040,0008)	2	Not allowed	Supported – zero-length value
>>Code Value	(0008,0100)	1	Not allowed	Not Supported
>>Coding Scheme Designator	(0008,0102)	1	Not allowed	Not Supported
>>Coding Scheme Version	(0008,0103)	3	Not allowed	Not Supported
>>Code Meaning	(0008,0104)	3	Not allowed	Not Supported
Patient's Name	(0010,0010)	2	Not allowed	Supported
Patient ID	(0010,0020)	2	Not allowed	Supported
Issuer of Patient ID	(0010,0021)	3	Not allowed	Not Supported
Issuer of Patient ID Qualifiers Sequence	(0010,0024)	3	Not allowed	Not Supported
>>Local Namespace Entity ID	(0040,0031)	1C	Not allowed	Not Supported
>>Universal Entity ID	(0040,0032)	1C	Not allowed	Not Supported
>>Universal Entity ID Type	(0040,0033)	1C	Not allowed	Not Supported
>All other attributes of Issuer of Patient ID Qualifiers Sequence		3	Not allowed	Not Supported
Patient's Birth Date	(0010,0030)	2	Not allowed	Supported
Patient's Sex	(0010,0040)	2	Not allowed	Supported
Referenced Patient Sequence	(0008,1120)	2	Not allowed	Supported – zero-length value
>Referenced SOP Class UID	(0008,1150)	1	Not allowed	Not Supported
>Referenced SOP Instance UID	(0008,1155)	1	Not allowed	Not Supported
Admission ID	(0038,0010)	3	Not allowed	Not Supported
Issuer of Admission ID Sequence	(0038,0064)	3	Not allowed	Not Supported
>>Local Namespace Entity ID	(0040,0031)	1C	Not allowed	Not Supported
>>Universal Entity ID	(0040,0032)	1C	Not allowed	Not Supported
>>Universal Entity ID Type	(0040,0033)	1C	Not allowed	Not Supported
Service Episode ID	(0038,0060)	3	Not allowed	Not Supported
Issuer of Service Episode ID Sequence	(0038,0064)	3	Not allowed	Not Supported
>>Local Namespace Entity ID	(0040,0031)	1C	Not allowed	
>>Universal Entity ID	(0040,0032)	1C	Not allowed	
>>Universal Entity ID Type	(0040,0033)	1C	Not allowed	
Service Episode Description	(0038,0062)	3	Not allowed	Not Supported

6.3.3 Performed Procedure Step Information Module

TABLE 6-4
PERFORMED PROCEDURE STEP INFORMATION MODULE ATTRIBUTES

Attribute Name	Tag	Type N-CREATE (SCU)	Type N-SET (SCU)	Use
Performed Procedure Step ID	(0040,0253)	1	Not allowed	Supported

Attribute Name	Tag	Type N-CREATE (SCU)	Type N-SET (SCU)	Use
Performed Station AE Title	(0040,0241)	1	Not allowed	Supported
Performed Station Name	(0040,0242)	2	Not allowed	Supported – zero-length value
Performed Location	(0040,0243)	2	Not allowed	Supported – zero-length value
Performed Procedure Step Start Date	(0040,0244)	1	Not allowed	Supported
Performed Procedure Step Start Time	(0040,0245)	1	Not allowed	Supported
Performed Procedure Step Status	(0040,0252)	1	3	Supported
Performed Procedure Step Description	(0040,0254)	2	3	Supported
Performed Procedure Type Description	(0040,0255)	2	3	Supported – zero-length value
Procedure Code Sequence	(0008,1032)	2	3	Supported – zero-length value
>Code Value	(0008,0100)	1	1	
>Coding Scheme Designator	(0008,0102)	1	1	
>Coding Scheme Version	(0008,0103)	3	3	
>Code Meaning	(0008,0104)	3	3	
Reason For Performed Procedure Code Sequence	(0040,1012)	3	3	Not Supported
>Code Value	(0008,0100)	1	1	
>Coding Scheme Designator	(0008,0102)	1	1	
>Coding Scheme Version	(0008,0103)	3	3	
>Code Meaning	(0008,0104)	1	1	
Performed Procedure Step End Date	(0040,0250)	2	3	Supported N-CREATE => zero-length value N-SET COMPLETE => end date
Performed Procedure Step End Time	(0040,0251)	2	3	Supported N-CREATE => zero-length value N-SET COMPLETE => end time
Comments on the Performed Procedure Step	(0040,0280)	3	3	Not Supported
Performed Procedure Step Discontinuation Reason Code Sequence	(0040,0281)	3	3	Supported N-CREATE => zero-length value N-SET COMPLETE => zero-length value N-SET DISCONTINUE => sequence provided
>Code Value	(0008,0100)	1	1	
>Coding Scheme Designator	(0008,0102)	1	1	
>Coding Scheme Version	(0008,0103)	3	3	
>Code Meaning	(0008,0104)	3	3	

6.3.4 Image Acquisition Results Module

TABLE 6-5
IMAGE ACQUISITION RESULTS MODULE ATTRIBUTES

Attribute Name	Tag	Type N-CREATE (SCU)	Type N-SET (SCU)	Use
Modality	(0008,0060)	1	Not allowed	Supported
Study ID	(0020,0010)	2	Not allowed	Supported
Performed Protocol Code Sequence	(0040,0260)	2	3	Supported – zero-length value
>Code Value	(0008,0100)	1	1	
>Coding Scheme Designator	(0008,0102)	1	1	
>Coding Scheme Version	(0008,0103)	3	3	
>Code Meaning	(0008,0104)	3	3	
Performed Series Sequence	(0040,0340)	2	3	Supported
>Performing Physician's Name	(0008,1050)	2	2	Supported
>Protocol Name	(0018,1030)	1	1	Supported
>Operator's Name	(0008,1070)	2	2	Supported

Attribute Name	Tag	Type N-CREATE (SCU)	Type N-SET (SCU)	Use
>Series Instance UID	(0020,000E)	1	1	Supported
>Series Description	(0008,103E)	2	2	Supported
>Retrieve AE Title	(0008,0054)	2	2	Supported
> Archive Requested	(0040,A494)	3	3	Not Supported
>Referenced Image Sequence	(0008,1140)	2	2	Supported N-CREATE => zero-length value N-SET DISCONTINUE => zero-length value N-SET COMPLETE => sequence provided if image instances are present, otherwise zero-length value
>>Referenced SOP Class UID	(0008,1150)	1	1	
>>Referenced SOP Instance UID	(0008,1155)	1	1	
>>Container Identifier	(0040,0512)	3	3	Not Supported
>>Specimen Description Sequence	(0040,0560)	3	3	Not Supported
>>>Specimen Identifier	(0040,0551)	1	1	Not Supported
>>>Specimen UID	(0040,0554)	1	1	Not Supported
>Referenced Non-Image Composite SOP Instance Sequence	(0040,0220)	2	2	Supported N-CREATE => zero-length value N-SET DISCONTINUE => zero-length value N-SET COMPLETE => sequence provided if non-image instances are present, otherwise zero-length value
>>Referenced SOP Class UID	(0008,1150)	1	1	
>>Referenced SOP Instance UID	(0008,1155)	1	1	

6.4 STANDARD EXTENDED AND PRIVATE DATA ATTRIBUTES

Centricity PACS does not support any Standard Extended or Private Attributes for MPPS instances.

6.5 STANDARD EXTENDED AND PRIVATE CONTEXT GROUPS

Centricity PACS RA1000 does not support any coded terminology using Standard Extended, Private, and Configurable Context Groups for MPPS instances.

7. INSTANCE AVAILABILITY NOTIFICATION IMPLEMENTATION

This section of the DICOM Conformance Statement specifies the implementation of the DICOM Instance Availability Notification information produced by Centricity PACS to be communicated to downstream information systems such as the Hospital/Radiology information system.

The Instance Availability Notification SOP is used for the N-CREATE request by the DAS AE Send Services as an SCU.

7.1 IOD MODULE TABLE

TABLE 7-1
IAN MODULES

Module Name	Reference
SOP Common	7.2.1
Instance Availability Notifications	7.2.2

7.2 INFORMATION MODULE DEFINITIONS

7.2.1 SOP Common Module

TABLE 7-2
SOP COMMON MODULE

Data Element	Tag	Type	Description
SOP Class UID	(0008,0016)	1	Uniquely identifies the SOP Class.
SOP Instance UID	(0008,0018)	1	Uniquely identifies the SOP Instance.
Specific Character Set	(0008,0005)	1C	Supports only ISO-IR-100 (ISO 8859-1) No other extended character sets are supported

7.2.2 Instance Availability Notification Module

TABLE 7-3
INSTANCE AVAILABILITY NOTIFICATION MODULE

Data Element	Tag	Type	Description
Referenced Performed Procedure Step Sequence	(0008,1111)	2	Uniquely identifies the Performed Procedure Step SOP Instance to which this availability notification instance is related, if any. The Sequence shall have zero or one Item. Notes: 1. This may refer to a different PPS than that encoded in the composite instances themselves. 2. It is typically used for notification about instances created as a consequence of some scheduled activity.
>Referenced SOP Class UID	(0008,1150)	1	Uniquely identifies the referenced SOP Class of the Performed Procedure Step.
>Referenced SOP Instance UID	(0008,1155)	1	Uniquely identifies the referenced SOP Instance of the Performed Procedure Step.
>Performed Workitem Code Sequence	(0040,4019)	2	A sequence that conveys the (single) type of procedure performed. Only a single Item shall be permitted in this sequence.
>>Code Value	(0008,0100)	1	Always set to "110005".
>>Coding Scheme Designator	(0008,0102)	1	Always set to "DCM".
>>Coding Scheme Version	(0008,0103)	3	Not Supported
>>Code Meaning	(0008,0104)	1	Always set to "Interpretation.
Study Instance UID	(0020,000D)	1	Unique identifier for the Study of which all the Instances referenced in this notification are part.
Referenced Series Sequence	(0008,1115)	1	Sequence of Items where each Item includes references to Instances within the same Series. One or more Items shall be included in this Sequence.
>Series Instance UID	(0020,000E)	1	Unique identifier of the Series of which all the Instances referenced in this Item are part.
>Referenced SOP Sequence	(0008,1199)	1	Sequence of Items where each Item includes a reference to a single Instance within this Series. One or more Items shall be included in this Sequence.
>>Referenced SOP Class UID	(0008,1150)	1	Uniquely identifies the referenced SOP Class.
>>Reference SOP Instance UID	(0008,1155)	1	Uniquely identifies the referenced SOP Instance.

Data Element	Tag	Type	Description
>>Instance Availability	(0008,0056)	1	Supported values are: "ONLINE": If the SOP Instance is on any short-term storage device "NEARLINE": If the SOP Instance is not available on any short-term storage device but is available on a local long-term storage device "OFFLINE": If the SOP Instance is not available on any short-term or local long-term storage device but is available on a remote long-term storage device "UNAVAILABLE": If the SOP Instance is not available on any short-term or long-term storage device
>>Retrieve AE Title	(0008,0054)	1	Always set to "GEPACS" or other configured DAS AE Title.

8. STORAGE COMMITMENT PUSH MODEL IMPLEMENTATION

8.1 STORAGE COMMITMENT PUSH MODEL INFORMATION OBJECT DEFINITION

Please refer to DICOM Part 3 (Information Object Definitions) for a description of each of the attributes contained within the Storage Commitment Information Object.

The Storage Commitment Information Object is used both for N-ACTION Storage Commitment Requests and N-EVENT-REPORT Storage Commitment Notifications by the DAS AE Storage Services SCP.

8.1.1 Storage Commitment Module for N-ACTION

TABLE 8-1
STORAGE COMMITMENT MODULE FOR N-ACTION

Attribute Name	Tag	SCP Use
Transaction UID	(0008,1195)	UID to identify this request
Storage Media File-Set ID	(0088,0130)	Not Supported
Storage Media File-Set UID	(0088,0140)	Not Supported
Referenced SOP Sequence	(0008,1199)	A list of SOP instances to be requested for Storage Commitment
>Referenced SOP Class UID	(0008,1150)	SOP Class UID of the instance
>Referenced SOP Instance UID	(0008,1155)	SOP Instance UID of the instance
>Storage Media File-Set ID	(0088,0130)	Not Supported
>Storage Media File-Set UID	(0088,0140)	Not Supported

8.1.2 Storage Commitment Module for N-EVENT-REPORT

TABLE 8-2
STORAGE COMMITMENT MODULE FOR N-EVENT-REPORT

Attribute Name	Tag	SCP Use
Transaction UID	(0008,1195)	UID to identify this Storage Commitment transaction
Retrieve AE Title	(0008,0054)	Not Supported
Storage Media File-Set ID	(0088,0130)	Not Supported
Storage Media File-Set UID	(0088,0140)	Not Supported

Attribute Name	Tag	SCP Use
Referenced SOP Sequence	(0008,1199)	A list of SOP instances to be committed for long-term archiving in Centricity PACS. This sequence should match the requested sequence in the corresponding Storage Commitment Request.
>Referenced SOP Class UID	(0008,1150)	SOP Class UID of the instance
>Referenced SOP Instance UID	(0008,1155)	SOP Instance UID of the instance
>Retrieve AE Title	(0008,0054)	Not Supported
>Storage Media File-Set ID	(0088,0130)	Not Supported
>Storage Media File-Set UID	(0088,0140)	Not Supported
Failed SOP Sequence	(0008,1198)	A list of SOP instances that are NOT committed for long-term archiving in Centricity PACS
>Referenced SOP Class UID	(0008,1150)	SOP Class UID of the instance
>Referenced SOP Instance UID	(0008,1155)	SOP Instance UID of the instance
>Failure Reason	(0008,1197)	See Section 8.1.2.1 for the list of processed values.

Centricity PACS guarantees the long-term archiving of the committed SOP Instances. A remote AE can retrieve the SOP Instance from Centricity PACS via the Query/Retrieve Provider of the DAS AE.

Note: Due to the data coercion of the SOP Instances as described in Section 2.3.1.4.2, the SOP Instance UID of an object may be altered. In this case, Centricity PACS is unable to send a success response to the Storage Commitment Request, even if the altered object has been successfully archived.

8.1.2.1 Set of possible values that may be sent in Failure Reason in a N-Event-Report

When generating a N-Event-Report stating that failure exist in the completion of the Storage Commitment request, following is the list of Failure Reason (0008,1197) code that this DAS AE Storage Services SCP may generate:

TABLE 8-3
FAILURE REASONS IN N-EVENT-REPORT FOR STORAGE COMMITMENT

Failure Reason	Meaning	Failure Reason Explanation
0110H	Processing failure	Requested SOP Instances are failed for archiving or the PACS installation site is designated not to archive data permanently.
0112H	No such object instance	Requested SOP Instances cannot be found in the Centricity PACS database (still not yet received when the job timer expired).
0213H	Resource limitation	Requested SOP Instances cannot be archived due to a temporary resource limitation.

9. PRINT MANAGEMENT IMPLEMENTATION

This section of the DICOM Conformance Statement specifies the CDPS AE implementation for the specific SOP Classes supported in the Basic Grayscale Print Management Meta SOP Class, the attributes supported for both IODs and services, and the valid range of values for mandatory and optional attributes.

9.1 PRINTER SOP CLASS

9.1.1 Printer N-EVENT-REPORT Attributes

The following table describes the product behavior when receiving a N-EVENT-REPORT request from the Printer SCP depending on the Event Type ID value.

TABLE 9-1
PRINTER N-EVENT-REPORT ATTRIBUTES

Event Type Name	Event Type ID	Attribute	Tag	Use
Normal	1			CDPS will continue with print request
Warning	2	Printer Status Info	(2110,0020)	CDPS will log warnings and continue.
		Film Destination	(2000,0040)	Not Supported
		Printer Name	(2110,0030)	Not Supported
Failure	3	Printer Status Info	(2110,0020)	For failures that require manual intervention, the association will be terminated, but CDPS will attempt to retry the print job until it succeeds. The following terms are supported:. RECEIVER FULL NO RECEIVE MGZ PRINTER INIT SUPPLY EMPTY NO SUPPLY MGZ FILM JAM All other defined terms returned will cause CDPS to terminate the association without retrying.
		Film Destination	(2000,0040)	Not Supported
		Printer Name	(2110,0030)	Not Supported

9.1.2 Printer N-GET Attributes

This table defines the set of attributes that CDPS AE may request using the Printer N-GET service. It also describes what is the product behavior when receiving the N-GET response from the Printer SCP.

TABLE 9-2
PRINTER N-GET ATTRIBUTES

Attribute Name	Tag	Use
Printer Status	(2110,0010)	Printer device status. NORMAL WARNING FAILURE
Printer Status Info	(2110,0020)	Additional information about printer device status
Printer Name	(2110,0030)	Printer name
Manufacturer	(0008,0070)	Manufacturer of the printer
Manufacturer Model Name	(0008,1090)	Manufacturer's model name of the printer
Device Serial Number	(0018,1000)	Manufacturer's serial number of the printer
Software Versions	(0018,1020)	Manufacturer's designation of software version of the printer
Date Of Last Calibration	(0018,1200)	Date when the printer was last calibrated.
Time Of Last Calibration	(0018,1201)	Time when the printer was last calibrated.

9.2 BASIC FILM SESSION SOP CLASS

9.2.1 Basic Film Session N-CREATE Attributes

This table lists the attributes that are sent in the Basic Film Session N-CREATE Request:

TABLE 9-3
BASIC FILM SESSION N-CREATE ATTRIBUTES

Attribute name	Tag	Use
Specific Character Set	(0008,0005)	Not Used
Number of Copies	(2000,0010)	Number of copies requested. The CDPS AE sends value one (1) or two (2).
Print Priority	(2000,0020)	The default value sent by the CDPS AE is MEDIUM. Three values can be sent: LOW MEDIUM HIGH These are configured by the CDPS user.
Medium Type	(2000,0030)	The default value sent by the CDPS AE is CURRENT. Four values can be sent: CURRENT PAPER CLEAR_FILM BLUE_FILM These are configured by the CDPS user.
Film Destination	(2000,0040)	The default value sent by the CDPS AE is CURRENT. Three values can be sent: CURRENT MAGAZINE PROCESSOR These are configured by the CDPS user.
Film Session Label	(2000,0050)	DICOM_PRINT
Memory Allocation	(2000,0060)	0

9.2.2 Basic Film Session N-DELETE

If the creation of the Basic Film Session succeeds, the CDPS AE continues to create all film box instances for the print job. After completion of the print job, the CDPS AE deletes the Basic Film Session instance by invoking an N-DELETE-RQ message.

9.3 BASIC FILM BOX SOP CLASS

9.3.1 Basic Film Box N-CREATE Attributes

This table lists the attributes that are sent to the SCP in the Basic Film Box N-CREATE Request, and that are received in the Basic Film Box N-Create Response from the SCP

TABLE 9-4
BASIC FILM BOX N-CREATE ATTRIBUTES

Attribute Name	Tag	Use
Image Display Format	(2010,0010)	STANDARD\C,R 1 ≤ C ≤ 4 1 ≤ R ≤ 6
Referenced Film Session Sequence	(2010,0500)	
>Referenced SOP Class UID	(0008,1150)	1.2.840.10008.5.1.1.1
>Referenced SOP Instance UID	(0008,1155)	UID returned by the called AE
Referenced Image Box Sequence	(2010,0510)	Specify how used when received in the N-Create Response from SCP
>Referenced SOP Class UID	(0008,1150)	
>Referenced SOP Instance UID	(0008,1155)	
Referenced Basic Annotation Box Sequence	(2010,0520)	Not Supported
>Referenced SOP Class UID	(0008,1150)	
>Referenced SOP Instance UID	(0008,1155)	
Film Orientation	(2010,0040)	PORTRAIT
Film Size ID	(2010,0050)	One of the following values: 8IN×10IN 10IN×12IN 10IN×14IN 11IN×14IN 14IN×14IN 14IN×17IN 24CM×24CM 24CM×30CM These are configured by the CDPS user.
Magnification Type	(2010,0060)	The default value sent by the CDPS AE is CUBIC. Four values can be sent: CUBIC REPLICATE BILINEAR NONE These are configured by the CDPS user.
Max Density	(2010,0130)	The default value sent by the CDPS AE is 264. Other values can be if configured by the CDPS user. The maximum value can be sent is 400.
Configuration Information	(2010,0150)	A user-defined value can be sent. This value is configured according to the Conformance Statement of the called AE.
Referenced Presentation LUT Sequence	(2050,0500)	Not Supported
>Referenced SOP Class UID	(0008,1150)	Not Supported
>Referenced SOP Instance UID	(0008,1155)	Not Supported
Annotation Display Format ID	(2010,0030)	Not Supported

Attribute Name	Tag	Use
Smoothing Type	(2010,0080)	Not Supported
Border Density	(2010,0100)	The default value sent by the CDPS AE is BLACK. Two values can be sent: BLACK WHITE These are configured by the CDPS user.
Empty Image Density	(2010,0110)	The default value sent by the CDPS AE is BLACK. Two values can be sent: BLACK WHITE These are configured by the CDPS user.
Min Density	(2010,0120)	Specify range of values sent.
Trim	(2010,0140)	The default value sent by the CDPS AE is YES. Two values can be sent: YES NO These are configured by the CDPS user.
Illumination	(2010,015E)	Not Supported
Reflected Ambient Light	(2010,0160)	Not Supported
Requested Resolution ID	(2020,0050)	Not Supported
ICC Profile	(0028,2000)	Not Supported

9.3.2 Basic Film Box N-ACTION Attributes

Following are the Action Reply arguments that are supported if present in the N-ACTION response of the Basic Film Box SOP Class

TABLE 9-5
BASIC FILM BOX N-ACTION ATTRIBUTES

Action Type Name	Action Type ID	Attribute	Tag	Usage SCU
Print	1	Referenced Print Job Sequence	(2100,0500)	Supported
		>Referenced SOP Class UID	(0008,1150)	
		>Referenced SOP Instance UID	(0008,1155)	
		>Print Job ID	(2100,0010)	Not Supported

9.3.3 Basic Film Box N-DELETE

After successful completion of setting all image boxes, the CDPS AE invokes an N-ACTION-RQ message to the Basic Film Box to print the film sheet. Finally, the CDPS AE deletes the Basic Film Box instance by sending an N-DELETE-RQ message to the called AE.

9.4 BASIC GRAYSCALE IMAGE BOX SOP CLASSES

9.4.1 Basic Grayscale Image Box Pixel N-SET Attributes

This table lists the attributes that are sent in the Basic Grayscale Image Box N-SET Request:

TABLE 9-6
BASIC GRAYSCALE IMAGE BOX PIXEL N-SET ATTRIBUTES

Attribute Name	Tag	Use
Image Position	(2020,0010)	An ordinal number of the image in the specified display format
Basic Grayscale Image Sequence	(2020,0110)	Include this sequence if Basic Grayscale Image Box
>Samples Per Pixel	(0028,0002)	1
>Photometric Interpretation	(0028,0004)	MONOCHROME2
>Rows	(0028,0010)	Number of rows of the pixel matrix
>Columns	(0028,0011)	Number of columns of the pixel matrix
>Pixel Aspect Ratio	(0028,0034)	This data element is sent if its value is not 1\1.
>Bits Allocated	(0028,0100)	16 or 8
>Bits Stored	(0028,0101)	12 or 8
>High Bit	(0028,0102)	11 or 7
>Pixel Representation	(0028,0103)	0
>Pixel Data	(7FE0,0010)	Pixel data stream
Polarity	(2020,0020)	Not Supported
Magnification Type	(2010,0060)	Not Supported
Smoothing Type	(2010,0080)	Not Supported
Min Density	(2010,0120)	Not Supported
Max Density	(2010,0130)	Not Supported
Configuration Information	(2010,0150)	Not Supported
Requested Image Size	(2020,0030)	Requested image width in mm. The CDPS AE sends this data element only if the user requested a true-size image print.
Requested Decimate/Crop Behavior	(2020,0040)	Not Supported
Referenced Presentation LUT Sequence	(2050,0500)	Not Supported
> Referenced SOP Class UID	(0008,1150)	Not Supported
> Referenced SOP Instance UID	(0008,1155)	Not Supported

10. QUERY IMPLEMENTATION

This section of the DICOM Conformance Statement specifies the DAS AE and RA1000 AE implementation of DICOM Query and the attributes supported for matching, and return values of mandatory and optional attributes.

10.1 CENTRICITY PACS MAPPING OF DICOM ENTITIES

The Centricity PACS maps DICOM Information Entities to local Information Entities in the product's database and user interface.

TABLE 10-1
MAPPING OF DICOM ENTITIES TO CENTRICITY PACS ENTITIES

DICOM	Centricity PACS Entity
Patient	patient
Study	study
Series	series
Image	image
Presentation State	presentation_state
Document	kos_document

10.2 INFORMATION MODEL KEYS

Please refer to DICOM Standard PS 3.4 (Service Class Specifications) for a description of each of the levels contained within the Query/Retrieve Information Model.

10.2.1 Common Query Keys

TABLE 10-2 Q/R COMMON RETRIEVE ATTRIBUTES

Attribute Name	Tag	Type	RA1000 AE SCU Use	DAS AE SCP Use
Specific Character Set	(0008,0005)	-	See Section 10.2.1.1.1	See Section 10.2.1.1.1
Query Retrieve Level	(0008,0052)	-	Set to level of query: PATIENT STUDY SERIES IMAGE	Matching
Retrieve AE Title	(0008,0054)	-	Attribute is not requested. Returned value is used for Retrieve AE Title of retrieval of query response item.	Returned
Instance Availability	(0008,0056)		Not Requested	Returned (See Section 10.2.1.1.2)

10.2.1.1 Q/R Common Attribute Descriptions

10.2.1.1.1 Specific Character Set

The RA1000 AE SCU does not make use of the Specific Character Set (0008,0005) attribute when encoding C-FIND queries or interpreting C-FIND responses.

The DAS AE SCP may include a multi-valued Person Name element in the query responses, if the query requesting AE has been configured to intend to receive the multi-valued names and these are available in Centricity PACS database. While the Alphabetic Name is always encoded with the ISO-IR-100 character set, the Ideographic and Phonetic Names can be encoded with other dual-byte character sets as listed in Section 2.8. In the current release, the DAS AE will not include text information encoded with extended character sets in any other data elements of the query responses.

See Centricity PACS service documentation for the peer AE configuration method.

10.2.1.1.2 Instance Availability

Centricity PACS supports the Instance Availability attribute (0008,0056) which defines how rapidly a composite object instance(s) become available for transmission from Centricity PACS after a C-MOVE retrieval request.

This attribute pertains to the set of composite object instances available at the Query/Retrieve Level specified in the identifier of the C-FIND request (e.g. Patient, Study, Series, Composite Object Instance). When some composite instances are less rapidly available than others, the Centricity PACS shall return the availability status of the least rapidly available instance.

Centricity PACS will provide one of three possible values for this attribute:

- "ONLINE" which means the instances are immediately available, or
- "NEARLINE" which means the instances need to be retrieved from relatively slow media such as optical disk or tape, or
- "OFFLINE" which means the instances need to be retrieved by manual intervention (e.g. need to load a tape into a tape library).

The contents of the Instance Availability attribute (0008,0056) that is returned by Centricity PACS, in the C-FIND response, for any of the four Query/Retrieve levels, is defined in Table 10-3.

TABLE 10-3
INSTANCE AVAILABILITY ATTRIBUTE CONTENTS

Q/R SCP Level	Contents of the Instance Availability attribute (0008,0056) in a C-FIND response
Patient	The availability status (ONLINE, NEARLINE, OFFLINE) of the least available SOP instance of all studies and all series for a particular patient.
Study	The availability status (ONLINE, NEARLINE, OFFLINE) of the least available SOP instance of a study and one or more series for a particular patient.
Series	The availability status (ONLINE, NEARLINE, OFFLINE) of the least available SOP instance of a series for a particular patient
Composite Object Instance	The availability status (ONLINE, NEARLINE, OFFLINE) of the specific SOP Instance being requested or matched.

The Centricity PACS will not return the Instance Availability attribute (0008,0056) in the C-FIND response if there was no match or if an error occurred (e.g. Database inconsistency problem, etc.)

10.2.2 Patient and Patient/Study Only Root

10.2.2.1 Patient Level

This section defines the keys at the Patient Level of the Patient Root and Patient/Study Only Query/Retrieve Information Models that are supported by this implementation.

Note: The RA1000 AE SCU only supports Study Root queries.

TABLE 10-4
PATIENT LEVEL ATTRIBUTES FOR THE PATIENT ROOT QUERY/RETRIEVE INFORMATION MODEL

Attribute Name	Tag	Type	DAS AE SCP Use
Patient's Name	(0010,0010)	R	Matching (See Section 10.3.1)
Patient ID	(0010,0020)	U	Matching
Issuer of Patient ID	(0010,0021)	O	Matching
Patient's Birth Date	(0010,0030)	O	Returned
Patient's Sex	(0010,0040)	O	Returned
Other Patient IDs	(0010,1000)	O	Returned
Ethnic Group	(0010,2160)	O	Returned

10.2.2.2 Study Level – Patient Root, Patient/Study Only

This section defines the keys at the Study Level of the Patient Root and Patient/Study Only Query/Retrieve Information Models that are supported by this implementation.

Note: The RA1000 AE SCU only supports Study Root queries.

TABLE 10-5
STUDY LEVEL ATTRIBUTES FOR THE PATIENT ROOT QUERY/RETRIEVE INFORMATION MODEL

Attribute Name	Tag	Type	DAS AE SCP Use
Study Date	(0008,0020)	R	Matching (See Section 10.3.1.2)>
Study Time	(0008,0030)	R	Matching (See Section 10.3.1.2)>
Accession Number	(0008,0050)	R	Matching
Study ID	(0020,0010)	R	Matching
Study Instance UID	(0020,000D)	U	Matching
Modalities in Study	(0008,0061)	O	Matching
Referring Physician's Name	(0008,0090)	O	Matching (See Section 10.3.1)
Study Description	(0008,1030)	O	Returned
Procedure Code Sequence	(0008,1032)	O	
>Code Value	(0008,0100)	O	Matching
>Code Meaning	(0008,0104)	O	Matching
Number of Study Related Series	(0020,1206)	O	Returned
Number of Study Related Instances	(0020,1208)	O	Returned

10.2.3 Study Root

10.2.3.1 Study Level – Study Root

This section defines the keys at the Study Level of the Study Root Query/Retrieve Information Model that are supported by this implementation.

TABLE 10-6
STUDY LEVEL ATTRIBUTES FOR THE STUDY ROOT QUERY/RETRIEVE INFORMATION MODEL

Attribute Name	Tag	Type	RA1000 AE SCU Use	DAS AE SCP Use
Study Date	(0008,0020)	R	Matching	Matching (See Section 10.3.1.2)
Study Time	(0008,0030)	R	Matching	Matching (See Section 10.3.1.2)
Accession Number	(0008,0050)	R	Matching	Matching
Patient's Name	(0010,0010)	R	Matching	Matching (See Section 10.3.1)
Patient ID	(0010,0020)	R	Matching	Matching
Study ID	(0020,0010)	R	Matching	Matching
Study Instance UID	(0020,000D)	U	Matching	Matching
Modalities in Study	(0008,0061)	O	Matching	Matching
Referring Physician's Name	(0008,0090)	O	Matching	Matching (See Section 10.3.1)
Study Description	(0008,1030)	O	Not Requested	Returned
Procedure Code Sequence	(0008,1032)	O		
>Code Value	(0008,0100)	O	Not Requested	Matching
>Code Meaning	(0008,0104)	O	Not Requested	Matching
Issuer of Patient ID	(0010,0021)	O	Not Requested	Matching
Number of Study Related Series	(0020,1206)	O	Not Requested	Returned
Number of Study Related Instances	(0020,1208)	O	Not Requested	Returned
Patient's Birth Date	(0010,0030)	O	Matching	Returned
Patient's Sex	(0010,0040)	O	Matching	Returned

10.2.3.2 Series Level

This section defines the keys at the Series Level of the Patient Root and Study Root Query/Retrieve Information Models that are supported by this implementation.

TABLE 10-7
SERIES LEVEL ATTRIBUTES FOR THE QUERY/RETRIEVE INFORMATION MODEL

Attribute Name	Tag	Type	RA1000 AE SCU Use	DAS AE SCP Use
Modality	(0008,0060)	R	Matching	Matching
Series Number	(0020,0011)	R	Matching	Matching
Series Instance UID	(0020,000E)	U	Matching	Matching
Number of Series Related Instances	(0020,1209)	O	Matching	Returned
Series Description	(0008,103E)	O	Not Requested	Returned
Request Attribute Sequence	(0040, 0275)	O		
>Requested Procedure ID	(0040,1001)	O	Matching	Matching
>Scheduled Procedure Step ID	(0040,0009)	O	Matching	Not Supported
Performed Procedure Step Start Date	(0040,0244)	O	Matching	Matching (See Section 10.3.1.2)
Performed Procedure Step Start Time	(0040,0245)	O	Matching	Matching (See Section 10.3.1.2)

10.2.3.3 Instance Level

This section defines the keys at the Image Level of the Patient Root and Study Root Query/Retrieve Information Models that are supported by this implementation.

The instance level attributes shared by all storage SOP classes is defined in Table 10-8.

TABLE 10-8
COMMON INSTANCE LEVEL ATTRIBUTES FOR THE QUERY/RETRIEVE INFORMATION MODEL

Attribute Name	Tag	Type	RA1000 AE SCU Use	DAS AE SCP Use
Instance Number	(0020,0013)	R	Matching	Matching
SOP Instance UID	(0008,0018)	U	Matching	Matching
SOP Class UID	(0008,0016)	O	Not Requested	Matching

The instance level attributes shared by image storage SOP classes is defined in Table 10-9.

TABLE 10-9
IMAGE INSTANCE LEVEL ATTRIBUTES FOR THE QUERY/RETRIEVE INFORMATION MODEL

Attribute Name	Tag	Type	RA1000 AE SCU Use	DAS AE SCP Use
Rows	(0028,0010)	O	Not Requested	Returned
Columns	(0028,0011)	O	Not Requested	Returned
Bits Allocated	(0028,0100)	O	Not Requested	Returned
Number of Frames	(0028,0008)	O	Not Requested	Returned

The instance level attributes shared by presentation state storage SOP classes is defined in Table 10-10.

TABLE 10-10
PRESENTATION STATE INSTANCE LEVEL ATTRIBUTES FOR THE QUERY/RETRIEVE INFORMATION MODEL

Attribute Name	Tag	Type	RA1000 AE SCU Use	DAS AE SCP Use
Presentation Label	(0070,0080)	O	Not Requested	Returned
Presentation Description	(0070,0081)	O	Not Requested	Returned
Presentation Creation Date	(0070,0082)	O	Not Requested	Matching (See Section 10.3.1.2)
Presentation Creation Time	(0070,0083)	O	Not Requested	Matching (See Section 10.3.1.2)
Presentation Creator's Name	(0070,0084)	O	Not Requested	Returned
Referenced Series Sequence	(0008,1115)	O		
>Series Instance UID	(0020,000E)	O	Not Requested	Returned
>Referenced Image Sequence	(0008,1140)	O		
>>Referenced SOP Class UID	(0008,1150)	O	Not Requested	Returned
>>Referenced SOP Instance UID	(0008,1155)	O	Not Requested	Returned

The instance level attributes shared by KOS/SR storage SOP classes is defined in Table 10-11.

TABLE 10-11
KOS / SR INSTANCE LEVEL ATTRIBURES FOR THE QUERY/RETRIEVE INFORMATION MODEL

Attribute Name	Tag	Type	RA1000 AE SCU Use	DAS AE SCP Use
Content Date	(0008,0023)	O	Not Requested	Matching (See Section 10.3.1.2)
Content Time	(0008,0033)	O	Not Requested	Matching (See Section 10.3.1.2)
Observation DateTime	(0040,A032)	O	Not Requested	Matching
Concept Name Code Sequence	(0040,A043)	O		
>Code Value	(0008,0100)	O	Not Requested	Matching
>Coding Scheme Designator	(0008,0102)	O	Not Requested	Matching
>Coding Scheme Version	(0008,0103)	O	Not Requested	Returned

Attribute Name	Tag	Type	RA1000 AE SCU Use	DAS AE SCP Use
>Code Meaning	(0008,0104)	O	Not Requested	Returned
Verifying Observer Sequence	(0040,A073)	O		
>Verifying Organization	(0040,A027)	O	Not Requested	Matching
>Verification DateTime	(0040,A030)	O	Not Requested	Matching
>Verifying Observer Name	(0040,A075)	O	Not Requested	Matching
>Verifying Observer Identification Code Sequence	(0040,A088)	O		
>>Code Value	(0008,0100)	O	Not Requested	Returned
>>Coding Scheme Designator	(0008,0102)	O	Not Requested	Returned
>>Coding Scheme Version	(0008,0103)	O	Not Requested	Returned
>>Code Meaning	(0008,0104)	O	Not Requested	Returned
Referenced Request Sequence	(0040,A370)	O		
>Study Instance UID	(0020,000D)	O	Not Requested	Matching
>Accession Number	(0008,0050)	O	Not Requested	Matching
>Requested Procedure ID	(0040,1000)	O	Not Requested	Matching
>Requested Procedure Code Sequence	(0032,1064)	O		
>>Code Value	(0008,0100)	O	Not Requested	Returned
>>Coding Scheme Designator	(0008,0102)	O	Not Requested	Returned
>>Coding Scheme Version	(0008,0103)	O	Not Requested	Returned
>>Code Meaning	(0008,0104)	O	Not Requested	Returned
Completion Flag	(0040,A491)	O	Not Requested	Matching
Verification Flag	(0040,A493)	O	Not Requested	Matching

10.3 IMPORTANT REMARKS

10.3.1 Matching Operations

The DAS AE supports Single Value matching for all keys of a supported type “Matching”.

The DAS AE supports Wild Card matching for all text valued keys of a supported type “Matching”.

The DAS AE supports UID List matching for all UID keys of a supported type “Matching”.

The DAS AE supports Sequence matching.

The DAS AE supports Range matching for the Date and Time keys.

10.3.1.1 Person Name Matching Operations

The DAS AE accepts a multi-valued Person Name data element as a matching key, if the Alphabetic Name is fully qualified. If the Alphabetic Name is partially qualified, only a single-valued Person Name element can be used as a matching key.

10.3.1.2 Date and Time Keys Matching Operations

The DAS AE supports a DICOM Query request using any matching operations in a date or time matching key specified in the DICOM PS 3.4, as listed in Table 10-12.

TABLE 10-12
DATE AND TIME MATCHING OPERATIONS

Specification	Key Value Description
NONE	No key or no key value was specified
EQ	<value> ; match all occurrences of value
GE	<value>- ; match all occurrences of value and subsequent values
LE	-<value> ; match all occurrences of prior to and including value
RANGE	<value1>-<value2> ; match all occurrences between value1 and value2 inclusive.

Because Centricity PACS saves the date and time values in one single field in the database, an arbitrarily independent search for the date and time keys in a DICOM Query request cannot be supported. For a combination of the date and time matching keys, the DAS AE will interpret the performed date and time joint matching as indicated in Table 10-13.

TABLE 10-13
DATE AND TIME JOINT MATCHING OPERATIONS PERFORMED BY THE DAS AE

Date Specification (See Table 10-12)	Time Specification (See Table 10-12)	Operation Performed
NONE	NONE	Search not qualified by date and time (ignored)
NONE	EQ, GE, LE, RANGE	Search not qualified by date and time (ignored)
EQ, GE, LE, RANGE	NONE	Search using date specification only
EQ	EQ, GE, LE, RANGE	Search using specified date and time
GE, LE, RANGE	EQ, GE, LE, RANGE	Search using date specification only

11. GENERAL PURPOSE WORKLIST IMPLEMENTATION

This section specifies the use of the DICOM General Purpose Worklist Information model used to organize data and against which a General Purpose Worklist Query, follow-up N-SET and N-ACTION requests will be performed.

11.1 CENTRICITY PACS MAPPING OF DICOM ENTITIES

The Centricity PACS maps DICOM Information Entities to local Information Entities in the product's database and user interface.

TABLE 11-1
MAPPING OF DICOM ENTITIES TO CENTRICITY PACS ENTITIES

DICOM	Centricity PACS Entity
Scheduled Procedure Step	scheduled_procedure_step
Requested Procedure	examination
Imaging Service Request	examination
Visit	Not Supported
Patient	patient

11.2 GENERAL PURPOSE SCHEDULED PROCEDURE STEP MODULES

The DAS AE supports the following data in the received N-ACTION request:

TABLE 11-2
DATA ELEMENTS SUPPORTED IN GP-SPS N-ACTION REQUEST

Attribute Name	Tag	Type (SCP)	Use
General Purpose Scheduled Procedure Step Status	(0040,4001)	1	Supported
Transaction UID	(0008,1195)	1	Supported
Actual Human Performers Sequence	(0040,4035)	1	Not Supported
>Human Performer Code Sequence	(0040,4009)	1	Not Supported
>>Code Value	(0008,0100)	1	Not Supported
>>Coding Scheme designator	(0008,0102)	1	Not Supported
>>Code Meaning	(0008,0104)	1	Not Supported
>Human Performer's Name	(0040,4037)	3	Not Supported
>Human Performer's Organization	(0040,4036)	3	Not Supported

11.3 GENERAL PURPOSE PERFORMED PROCEDURE STEP MODULES

The DAS AE supports the following data elements in a received N-CREATE request and N-SET request:

TABLE 11-3
SOP COMMON ATTRIBUTES

Attribute Name	Tag	Type N-CREATE (SCP)	Type N-SET (SCP)	Use
Specific Character Set	(0008,0005)	1C	Not Allowed	Supported

TABLE 11-4
GENERAL PURPOSE PERFORMED PROCEDURE STEP RELATIONSHIP ATTRIBUTES

Attribute Name	Tag	Type N-CREATE (SCP)	Type N-SET (SCP)	Use
Referenced Request Sequence	(0040,A370)	2	Not Allowed	Supported
>Study Instance UID	(0020,000D)	1	Not Allowed	Supported
>Referenced Study Sequence	(0008,1110)	2	Not Allowed	Supported
>>Referenced SOP Class UID	(0008,1150)	1	Not Allowed	Not Supported
>>Referenced SOP Instance UID	(0008,1155)	1	Not Allowed	Supported
>Accession Number	(0008,0050)	2	Not Allowed	Supported
>Requested Procedure Code Sequence	(0032,1064)	2	Not Allowed	Not Supported
>>Code Value	(0008,0100)	1	Not Allowed	Not Supported
>>Coding Scheme Designator	(0008,0102)	1	Not Allowed	Not Supported
>>Coding Scheme Version	(0008,0103)	3	Not Allowed	Not Supported
>>Code Meaning	(0008,0104)	1	Not Allowed	Not Supported
>Placer Order Number/Imaging Service Request	(0040,2016)	3	Not Allowed	Not Supported
>Filler Order Number/Imaging Service Request	(0040,2017)	3	Not Allowed	Not Supported
>Requested Procedure ID	(0040,1001)	2	Not Allowed	Supported
>Requested Procedure Description	(0032,1060)	2	Not Allowed	Not Supported
Referenced General Purpose Schedule Procedure Step Sequence	(0040,4016)	1C	Not Allowed	Supported
>Referenced SOP Class UID	(0008,1150)	1	Not Allowed	Not Supported
>Referenced SOP Instance UID	(0008,1155)	1	Not Allowed	Supported
>Referenced General Purpose Scheduled Procedure Step Transaction UID	(0040,4023)	1	Not Allowed	Supported
Patient's Name	(0010,0010)	2	Not Allowed	Supported
Patient ID	(0010,0020)	2	Not Allowed	Supported
Issuer of Patient ID	(0010,0021)	3	Not Allowed	Supported
Patient's Birth Date	(0010,0030)	2	Not Allowed	Supported
Patient's Sex	(0010,0040)	2	Not Allowed	Supported

TABLE 11-5
GENERAL PURPOSE PERFORMED PROCEDURE STEP INFORMATION ATTRIBUTES

Attribute Name	Tag	Type N-CREATE (SCP)	Type N-SET (SCP)	Use
Actual Human Performers Sequence	(0040,4035)	2	Not Allowed	Not Supported
>Human Performer Code Sequence	(0040,4009)	1	Not Allowed	Not Supported
>>Code Value	(0008,0100)	1	Not Allowed	Not Supported
>>Coding Scheme Designator	(0008,0102)	1	Not Allowed	Not Supported
>>Coding Scheme Version	(0008,0103)	3	Not Allowed	Not Supported
>>Code Meaning	(0008,0104)	1	Not Allowed	Not Supported
>Human Performer's Name	(0040,4037)	3	Not Allowed	Not Supported
>Human Performer's Organization	(0040,4036)	3	Not Allowed	Not Supported
Performed Procedure Step ID	(0040,0253)	1	Not Allowed	Not Supported
Performed Station Name Code Sequence	(0040,4028)	2	Not Allowed	Not Supported
>Code Value	(0008,0100)	1	Not Allowed	Not Supported
>Coding Scheme Designator	(0008,0102)	1	Not Allowed	Not Supported

Attribute Name	Tag	Type N-CREATE (SCP)	Type N-SET (SCP)	Use
>Coding Scheme Version	(0008,0103)	3	Not Allowed	Not Supported
>Code Meaning	(0008,0104)	1	Not Allowed	Not Supported
Performed Station Class Code Sequence	(0040,4029)	2	Not Allowed	Not Supported
>Code Value	(0008,0100)	1	Not Allowed	Not Supported
>Coding Scheme Designator	(0008,0102)	1	Not Allowed	Not Supported
>Coding Scheme Version	(0008,0103)	3	Not Allowed	Not Supported
>Code Meaning	(0008,0104)	1	Not Allowed	Not Supported
Performed Station Geographic Location Code Sequence	(0040,4030)	2	Not Allowed	Not Supported
>Code Value	(0008,0100)	1	Not Allowed	Not Supported
>Coding Scheme Designator	(0008,0102)	1	Not Allowed	Not Supported
>Coding Scheme Version	(0008,0103)	3	Not Allowed	Not Supported
>Code Meaning	(0008,0104)	1	Not Allowed	Not Supported
Performed Processing Applications Code Sequence	(0040,4007)	2	Not Allowed	Not Supported
>Code Value	(0008,0100)	1	Not Allowed	Not Supported
>Coding Scheme Designator	(0008,0102)	1	Not Allowed	Not Supported
>Coding Scheme Version	(0008,0103)	3	Not Allowed	Not Supported
>Code Meaning	(0008,0104)	1	Not Allowed	Not Supported
Performed Procedure Step Start Date	(0040,0244)	1	Not Allowed	Not Supported
Performed Procedure Step Start Time	(0040,0245)	1	Not Allowed	Not Supported
General Purpose Performed Procedure Step Status	(0040,4002)	1	1	Not Supported
Performed Procedure Step Description	(0040,0254)	2	2	Not Supported
Comments on Performed Procedure Steps	(0040,0280)	3	3	Not Supported
Performed Workitem Code Sequence	(0040,4019)	2	Not Allowed	Supported
>Code Value	(0008,0100)	1	Not Allowed	Supported
>Coding Scheme Designator	(0008,0102)	1	Not Allowed	Supported
>Coding Scheme Version	(0008,0103)	3	Not Allowed	Supported
>Code Meaning	(0008,0104)	1	Not Allowed	Supported
Performed Procedure Step End Date	(0040,0250)	2	1	Not Supported
Performed Procedure Step End Time	(0040,0251)	2	1	Not Supported

TABLE 11-6
GENERAL PURPOSE RESULTS ATTRIBUTES

Attribute Name	Tag	Type N-CREATE (SCP)	Type N-SET (SCP)	Use
Output Information Sequence	(0040,4033)	2	2	Supported
>Study Instance UID	(0020,000D)	1	1	Supported
>Referenced Series Sequence	(0008,1115)	1	1	Supported
>>Series Instance UID	(0020,000E)	1	1	Supported
>>Retrieve AE Title	(0008,0054)	2	2	Supported
>>Referenced SOP Sequence	(0008,1199)	1	1	Supported
>>> Referenced SOP Class UID	(0008,1150)	1	1	Supported
>>> Referenced SOP Instance UID	(0008,1155)	1	1	Supported

11.4 GENERAL PURPOSE WORKLIST QUERY MODULES

Please refer DICOM PS 3.3 and PS 3.4 for a complete definition of the entities, modules, and attributes.

Note: Several query matching and return keys defined in the tables below are not supported by the DAS AE GPWL C-FIND request in Centricity PACS. The current implementation of GPWL is designed to offer minimal support.

The DAS AE supports the following matching key in the received C-FIND request and returned keys in the C-FIND response:

TABLE 11-7
SOP COMMON

Attribute Name	Tag	Matching Key Type	Return Key Type	Usage
Specific Character Set	(0008,0005)	-	1C	Returned
SOP Class UID	(0008,0016)	O	1	Returned
SOP Instance UID	(0008,0018)	U	1	Returned Only

TABLE 11-8
GENERAL PURPOSE SCHEDULED PROCEDURE STEP INFORMATION

Attribute Name	Tag	Matching Key Type	Return Key Type	Usage
General Purpose Scheduled Procedure Step Status	(0040,4001)	R	1	Returned Only
Input Availability Flag	(0040,4020)	R	1	Matching
General Purpose Scheduled Procedure Step Priority	(0040,4003)	R	1	Returned Only
Scheduled Procedure Step ID	(0040,0009)	O	1	Returned
Scheduled Procedure Step Modification Date Time	(0040,4010)	O	3	Not Supported
Scheduled Workitem Code Sequence	(0040,4018)	R	1	
>Code Value	(0008,0100)	R	1	Matching
>Coding Scheme Designator	(0008,0102)	R	1	Returned Only
>Code Meaning	(0008,0104)	-	1	Returned
Scheduled Processing Applications Code Sequence	(0040,4004)	O	2	Not Supported
>Code Value	(0008,0100)	O	1	Not Supported
>Coding Scheme Designator	(0008,0102)	O	1	Not Supported
>Code Meaning	(0008,0104)	-	1	Not Supported
Scheduled Station Name Code Sequence	(0040,4025)	R	2	Not Supported
>Code Value	(0008,0100)	R	1	Not Supported
>Coding Scheme Designator	(0008,0102)	R	1	Not Supported
>Code Meaning	(0008,0104)	-	1	Not Supported
Scheduled Station Class Code Sequence	(0040,4026)	R	2	Not Supported
>Code Value	(0008,0100)	R	1	Not Supported
>Coding Scheme Designator	(0008,0102)	R	1	Not Supported
>Code Meaning	(0008,0104)	-	1	Not Supported
Scheduled Station Geographic Location Code Sequence	(0040,4027)	R	2	Not Supported
>Code Value	(0008,0100)	R	1	Not Supported
>Coding Scheme Designator	(0008,0102)	R	1	Not Supported
>Code Meaning	(0008,0104)	-	1	Not Supported
Scheduled Procedure Step Start Date Time	(0040,4005)	R	1	Matching
Expected Completion Date Time	(0040,4011)	R	2	Not Supported
Scheduled Human Performers Sequence	(0040,4034)	R	2	Not Supported
>Human Performer Code Sequence	(0040,4009)	R	1	Not Supported
>>Code Value	(0008,0100)	R	1	Not Supported
>>Coding Scheme Designator	(0008,0102)	R	1	Not Supported
>>Code Meaning	(0008,0104)	-	1	Not Supported
>Human Performer's Name	(0040,4037)	O	3	Not Supported
>Human Performer's Organization	(0040,4036)	O	3	Not Supported

Attribute Name	Tag	Matching Key Type	Return Key Type	Usage
Referenced Performed Procedure Step Sequence	(0008,1111)	O	2	Not Supported
>Referenced SOP Class UID	(0008,1150)	O	1	Not Supported
>Referenced SOP Instance UID	(0008,1155)	O	1	Not Supported
Input Information Sequence	(0040,4021)	O	2	Returned
>Study Instance UID	(0020,000D)	O	1	Returned
>Referenced Series Sequence	(0008,1115)	O	1	Returned
>>Series Instance UID	(0020,000E)	O	1	Returned
>>Retrieve AE Title	(0008,0054)	O	2C	Returned
>>Storage Media File-Set ID	(0088,0130)	O	2C	Not Supported
>>Storage Media File-Set UID	(0088,0140)	O	2C	Not Supported
>>Referenced SOP Sequence	(0008,1199)	O	1	Returned
>>>Referenced SOP Class UID	(0008,1150)	O	1	Returned
>>>Referenced SOP Instance UID	(0008,1155)	O	1	Returned
>>>Purpose of Reference Code Sequence	(0040,A170)	O	3	Not Supported
>>>>Code Value	(0008,0100)	-	1	Not Supported
>>>>Coding Scheme Designator	(0008,0102)	-	1	Not Supported
>>>>Code Meaning	(0008,0104)	-	1	Not Supported
Relevant Information Sequence	(0040,4022)	O	2	Not Supported
>Study Instance UID	(0020,000D)	O	1	Not Supported
>Referenced Series Sequence	(0008,1115)	O	3	Not Supported
>>Series Instance UID	(0020,000E)	O	1	Not Supported
>>Retrieve AE Title	(0008,0054)	O	2C	Not Supported
>>Storage Media File-Set ID	(0088,0130)	O	2C	Not Supported
>>Storage Media File-Set UID	(0088,0140)	O	2C	Not Supported
>>Referenced SOP Sequence	(0008,1199)	O	1	Not Supported
>>>Referenced SOP Class UID	(0008,1150)	O	1	Not Supported
>>>Referenced SOP Instance UID	(0008,1155)	O	1	Not Supported
>>>Purpose of Reference Code Sequence	(0040,A170)	O	3	Not Supported
>>>>Code Value	(0008,0100)	-	1	Not Supported
>>>>Coding Scheme Designator	(0008,0102)	-	1	Not Supported
>>>>Code Meaning	(0008,0104)	-	1	Not Supported
Resulting General Purpose Performed Procedure Step Sequence	(0040,4015)	O	2	Not Supported
>Referenced SOP Class UID	(0008,1150)	O	1	Not Supported
>Referenced SOP Instance UID	(0008,1155)	O	1	Not Supported
Actual Human Performers Sequence	(0040,4035)	O	2	Not Supported
>Human Performer Code Sequence	(0040,4009)	O	1	Not Supported
>>Code Value	(0008,0100)	O	1	Not Supported
>>Coding Scheme Designator	(0008,0102)	O	1	Not Supported
>>Code Meaning	(0008,0104)	-	1	Not Supported
>Human Performer's Name	(0040,4037)	O	3	Not Supported
>Human Performer's Organization	(0040,4036)	O	3	Not Supported
Study Instance UID	(0020,000D)	O	1	Not Supported
Study Date	(0008,0020)	O	3	Not Supported
Study Time	(0008,0030)	O	3	Not Supported
Multiple Copies Flag	(0040,4006)	O	1	Not Supported

TABLE 11-9
GENERAL PURPOSE SCHEDULED PROCEDURE STEP RELATIONSHIP

Attribute Name	Tag	Matching Key Type	Return Key Type	Usage
Referenced Request Sequence	(0040,A370)	O	1	Returned
>Study Instance UID	(0020,000D)	O	1	Returned
>Referenced Study Sequence	(0008,1110)	O	2	Returned
>>Referenced SOP Class UID	(0008,1150)	O	1	Returned
>>Referenced SOP Instance UID	(0008,1155)	O	1	Matching

Attribute Name	Tag	Matching Key Type	Return Key Type	Usage
>Requested Procedure ID	(0040,1001)	O	1	Returned
>Requested Procedure Description	(0032,1060)	O	1C	Returned
>Requested Procedure Code Sequence	(0032,1064)	O	1C	Not Supported
>>Code Value	(0008,0100)	O	1	Not Supported
>>Coding Scheme Designator	(0008,0102)	O	1	Not Supported
>>Code Meaning	(0008,0104)	-	1	Not Supported
>Accession Number	(0008,0050)	R	2	Matching
>Requesting Physician	(0032,1032)	O	2	Not Supported

TABLE 11-10
PATIENT IDENTIFIER

Attribute Name	Tag	Matching Key Type	Return Key Type	Usage
Patient's Name	(0010,0010)	R	1	Matching
Patient ID	(0010,0020)	R	1	Matching
Issuer of Patient ID	(0010,0021)	O	3	Matching

Note: The DAS AE accepts a multi-valued Patient's Name data element as a matching key, if the Alphabetic Name is fully qualified. If the Alphabetic Name is partially qualified, only a single-valued Patient's Name element can be used as a matching key.

TABLE 11-11
PATIENT DEMOGRAPHIC

Attribute Name	Tag	Matching Key Type	Return Key Type	Usage
Patient's Birth Date	(0010,0030)	O	2	Matching
Patient's Sex	(0010,0040)	O	2	Matching

11.5 STANDARD EXTENDED AND PRIVATE DATA ATTRIBUTES

Centricity PACS does not support any Standard Extended or Private Attributes for GPWL instances.

11.6 STANDARD EXTENDED AND PRIVATE CONTEXT GROUPS

Centricity PACS does not support any coded terminology using Standard Extended, Private, and Configurable Context Groups for GPWL instances.

12. PRIVATE ATTRIBUTES IMPLEMENTATION

Centricity PACS adds several private attributes to all storage SOP instances that are stored and subsequently retrieved or exported. The following sections define

12.1 PRIVATE DATA ELEMENTS OF ORIGINAL UID VALUES

When Centricity PACS changes the values of Study Instance UID, Series Instance UID and/or SOP Instance UID, the original UID values are saved as private data elements in the same data set, as shown in Table 12-1.

TABLE 12-1
PRIVATE DATA ELEMENTS FOR ORIGINAL UID VALUES

Data Element	Tag	VR	VM	Description
Private Creator ID	(0907,00xx)	LO	1	"GEIIS". Reserve Element Numbers 0000-00FF of group 0907 in the SOP Instance.
Original Study Instance UID	(0907,xx10)	UI	1	The value of the original Study Instance UID, which has been changed into the current value in (0020,000D).
Original Series Instance UID	(0907,xx20)	UI	1	The value of the original Series Instance UID, which has been changed into the current value in (0020,000E).
Original SOP Instance UID	(0907,xx30)	UI	1	The value of the original SOP Instance UID, which has been changed into the current value in (0008,0018).

Where: xx = 00 to FF

Centricity PACS changes the UID values for resolving any conflict of the UID values in the received data set to the UID values maintained in the Centricity PACS database.

12.2 PRIVATE DATA ELEMENTS OF SIGNIFICANT/ REJECT/ CONFIDENTIAL

When Centricity PACS archives or sends out the SOP Instance the values of Significant, Reject, Confidential flag of the Image and Patient are saved as private data elements in the same data set, as shown in Table 12-2.

TABLE 12-2
PRIVATE DATA ELEMENTS FOR SIGNIFICANT/REJECT/CONFIDENTIAL VALUES

Data Element	Tag	VR	VM	Description
Private Creator ID	(0903,00xx)	LO	1	"GEIIS PACS". Reserve Element Numbers 0000-00FF of group 0903 in the SOP Instance.
Reject Image Flag	(0903,xx10)	UI	1	The value of 0 or 1 will be stored to indicate if the image is rejected or not.
Significant Flag	(0903,xx11)	UI	1	The value of 0 or 1 will be stored to indicate if the image is significant or not.
Confidential Flag	(0903,xx12)	UI	1	The value of 0 or 1 will be stored to indicate if the image belongs to a confidential patient.

Where: xx = 00 to FF

12.3 PRIVATE DATA ELEMENTS OF GRAYSCALE SOFTCOPY PRESENTATION STATE IOD

When Centricity PACS RA1000 creates a Grayscale Softcopy Presentation State IOD it will add several private attributes. Refer to Section 4.4 for more details.

12.4 PRIVATE DATA ELEMENTS OF COMPRESSION INFORMATION

When Centricity PACS compresses the pixel data of the image, adds the private data element in the same data set with compression information, as shown in Table 12-3.

TABLE 12-3
PRIVATE DATA ELEMENTS COMPRESSION TYPE INFORMATION VALUES

Data Element	Tag	VR	VM	Description
Private Creator ID	(7FD1,00xx)	LO	1	"GEIIS". Reserve Element Numbers 0000-00FF of group 7FD1 in the SOP Instance.
Compression Type	(7FD1,xx10)	UL	1	Compression type used to encode the pixel data.
Frame Offsets	(7FD1,xx20)	UL	1-n	Frame Offset values.
Sub-band Level	(7FD1,xx30)	UL	1	Maximum sub-band levels in multi-resolution image.
Row Count Sub-Band	(7FD1,xx40)	UL	1-n	Row count for a level in multi-resolution image.
Column Count Sub-Band	(7FD1,xx50)	UL	1-n	Column Count for a level in multi-resolution image.
Byte Count sub-Band	(7FD1,xx60)	UL	1-n	Byte Count for a level in multi-resolution image.

Where: xx = 00 to FF

12.5 PRIVATE DATA ELEMENTS OF ASSIGNING AUTHORITY INFORMATION

When Centricity PACS acquires, archives or sends out the SOP Instance the values of Assigning authority of the patient identifier are saved as private data elements in the same data set, as shown in Table 12-4.

TABLE 12-4
PRIVATE DATA ELEMENTS FOR GLOBAL ASSIGNING AUTHORITY VALUES

Data Element	Tag	VR	VM	Description
Private Creator ID	(0905,00xx)	LO	1	"GEIIS PACS". Reserve Element Numbers 0000-00FF of group 0903 in the SOP Instance.
Assigning Authority	(0905,xx10)	LO	1	Global Assigning Authority value.

Where: xx = 00 to FF